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STEAM DREDGING.

The first of the accompanying cuts represents one of the steam dredgers used for excavating the Suez Canal. They are worked by engines of fourteen to eighteen horse-power, at high pressure, without condensers, having driving-belts and cog-wheels driving the tumblers. The hulls, of iron, are seventy-two and eighty-two feet long, with twenty-three feet beam. In order to add to their stability with their long shoots, a wooden lighter is firmly lashed alonside. The buckets are from three and a half to five and a half cubic feet in capacity, and the delivery is at the rate of about twenty buckets per minute. The shoots are made sheet-iron four feet wide, with cross-section of semi-ellipse and the long axis horizontal, and are inclined from one in twelve to one in sixteen; their length being from sixty-five to seventy-two feet. Sixteen of these dredgers have been used to make eighteen miles of new cut, fifty-nine to sixty-five feet wide and from six to ten feet deep. That portion of the spoil from the main cut of the canal which is not deposited upon the banks by the dredger-shoots is delivered into ballast-lighters, which disgorge the spoil in deep water in the Mediterranean. The English sea-going ballast-lighters hold two hundred and seventeen cubic yards, and have one screw driven by an engine of fifty-horse-power, working with surface-condensers; these are excellent boats, both in form and construction, and also in the simplicity of their whole arrangement. Others, built in France, carry two hundred and sixty-one cubic yards, and work at high pressure without condensing. The speed in both cases is about seven or eight miles per hour. In the course of working it was remarked that by the passage of the vessels, and especially of the small steam-tugs, the sides of the canal were worn down somewhat rapidly when dressed to a slope of one in two, though it was found that the action of the waves had formed a sort of gently shelving shore, on which their force was spent without further injury to the slopes. This clearly howed that all that was necessary for the further protection of the slopes was to shift back the spoil-banks to such a distance that not only might the slopes of the channel of the canal be made flatter without causing the sides and spoil-banks themselves to give way, but also that there might be formed along the water line a sufficiently wide ledge to serve as a gently shelving shore for the waves to break upon. For this reason the width of the canal, at the surface of the water, was increased to three hundred and twenty-eight feet, and the inner crests of the spoil-banks were made three hundred and ninety-four feet apart, or one hundred and ninety-seven feet distant on each side from the center line of the canal. This necessarily increased the quantity to be excavated, and means had to be devised for depositing on each bank two hundred and forty-six cubic yards of spoil per yard run; and a most successful solution of the difficulty was found in the adoption of extra long shoots. But it then became necessary to give the dredgers an unusual height, and to make the shoots two hundred and thirty feet long; and it was consequently impossible to retain the same arrangement of the parts as in the smaller dredgers. The new arrangement, however, presented the great advantage of doing away with cranes, ballast-lighters, and especially wagons for moving the spoil, which, running over banks made of mud or wet clay broken up by the buckets, were constantly getting out of order. Moreover, with the aid of a few torches, the dredger could be worked by night as well as by day. The dredger here illustrated is one of those with extra long shoots. Many of them are now at work with satisfactory success. The second cut represents an elevator used in the excavation of those comparatively short portions of the canal where the ground is too light for even the long-shoot dredgers of forty-eight feet height. An attempt was made to work in such cases with cranes, carried on the canal boats, but the instability of the banks defeated this plan, and led to the device of the elevator, which rests, as the illustration shows, partly on the bank and partly on the lighter in the canal. Besides the advantage of the distribution of the weight, the greater length of the elevator allows the discharge of a larger proportion—at least one-half—of the spoil upon the banks without the use of wagons or any further hauling. The MANUFACTURER AND BUILDER for March contains an elaborate article upon this subject, giving a detailed description of the machinery and mode of operations, and accompanied with numerous cuts, from which we have selected the two herewith presented.

Fig 1

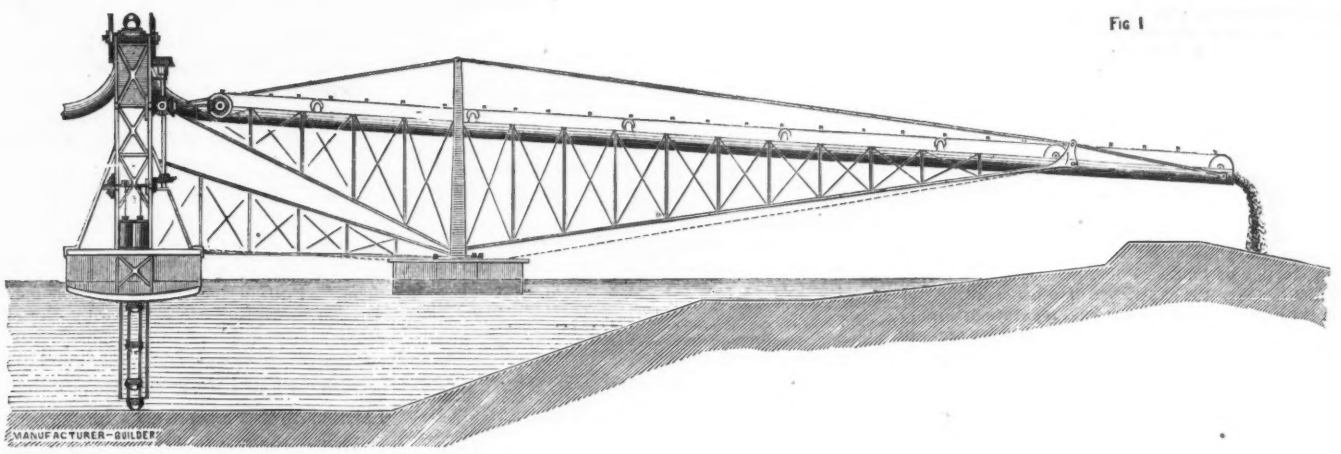
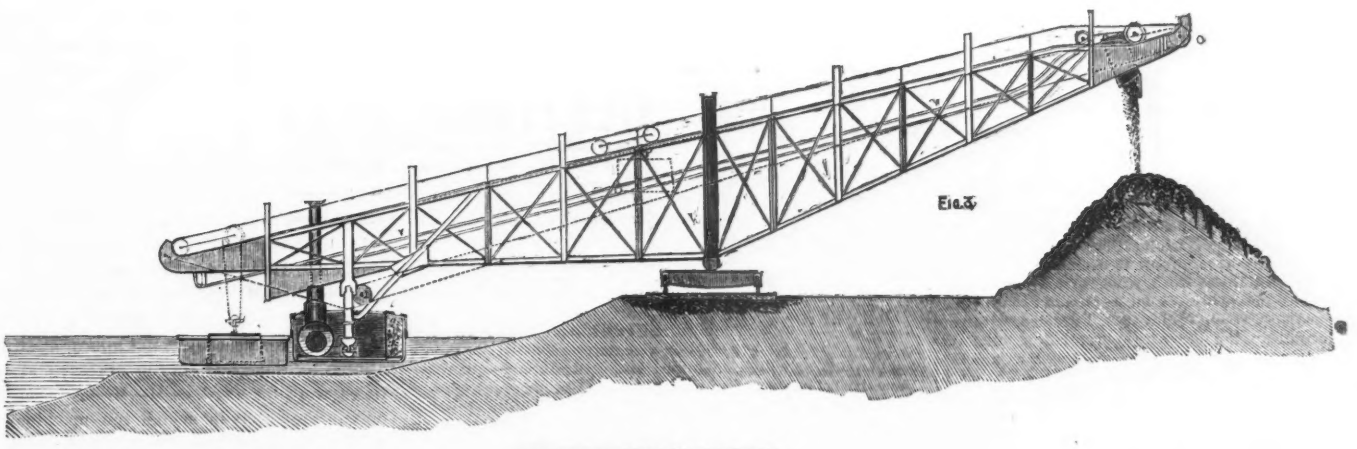


Fig 2



IMPROVED STEAM DREDGER.

The First Machinist.

One of the first persons who employed labor-saving machines was Bramah, the maker of the patent lock. He found it necessary to give the greatest exactness to every part of the ward and key of this celebrated lock. This he found very difficult to do without employing the very best workmen, and their charges were so exorbitant, that his invention was in a fair way of dropping out of use on account of expense. In this dilemma he was forced to turn his attention to the introduction of machinery to produce with unerring nicety the different parts of the complicated little apparatus with which his name is yet associated. The workshop in which the many clever contrivances to perform this work with speed were invented, may be said to have been the training-school for the early machinists, whose labors have within the present century built up the mechanical greatness of England. Accuracy of machine-work before his day was utterly unknown. Watt had the greatest difficulty in getting his first model of the steam engine constructed with sufficient truth to work; its cylinder was not bored but hammered, and consequently was so imperfect that it leaked in every direction, and when his "old white iron man" died, he was plunged into despair to obtain another skilled man. Even when he had obtained the trained workmen of the Soho Foundry, they found a difficulty at first in constructing working engines after his design. The accuracy and quality of the best workmen of the men may be gauged by what he says of

the working of his steam engine:—"The velocity, violence, magnitude, and horrible noise of the engine give universal satisfaction to all beholders—believers or not." What a contrast this to the smooth, irresistible, noiseless action of the steam engine of the present day, constructed with mathematical accuracy and perfect finish.

The Mines of the West.

EXTRACTS FROM THE REPORT OF THE COMMISSIONER OF MINING STATISTICS.

LETTER OF INSTRUCTIONS.

Treasury Department, April 1, 1868.

Sir: An appropriation having been made by Congress to enable the Secretary of the Treasury to collect reliable statistics of the mineral resources of the United States, a special appointment was conferred on Mr. J. Ross Browne, under which he performed this service in the States and Territories west of the Rocky Mountains.

To Mr. James W. Taylor the duty of collecting similar statistics east of the Rocky Mountains was assigned.

The position held by Mr. Browne having become vacant, and it being in the opinion of the department important that the work should be continued, you have this day been appointed a special commissioner for the collection of statistics in the western division above specified. A copy of the instructions under which Mr. Browne performed his duties is herewith enclosed.

Inasmuch as his preliminary report, printed by Congress in 1867, and his subsequent report for 1868, now in the hands of the public printer, cover the material points embraced in the instructions, it will be unnecessary for you to enter into similar investigations in detail, except in cases where omissions may have occurred, or where the information obtained may appear to be erroneous or imperfect.

The most important subjects for inquiry at present seem to be—

First. As to the different processes of treating the ores, their chemical combinations, and the system demonstrated by practical experience to be the most successful.

Second. The relative merits of the various inventions, machines, and mechanical contrivances now in use or projected for the reduction of the precious metals, and for all other purposes connected with the business of mining and metallurgy.

Third. The special needs of the great mining interest, how it can be encouraged and rendered most productive, how far individual enterprise should be left untrammeled by legislative action, and to what extent and in what instances government might properly lend its aid to facilitate the development of the mines and thus arrest the present annual decrease in the production of bullion.

Fourth. What has been the experience of other countries, resulting from the establishment of national institutions for the education of miners, and how far would the systems prevailing in Europe be applicable to our people or appropriate under our government?

General suggestions of this kind cannot of course always be implicitly carried out, but it is expected that your scientific and practical experience will enable you to furnish valuable information on the subjects indicated.

It will be necessary, in the performance of the duties assigned to you, that you should visit in person the principal States and Territories embraced within your division.

I am respectfully,

Hugh McCulloch,
Secretary of the Treasury.

R. W. Raymond, Esq.,
New York City.

LETTER FROM ROSSITER W. RAYMOND, COMMISSIONER FOR THE COLLECTION OF MINING STATISTICS, TO THE SECRETARY OF THE TREASURY.

Washington, D. C., Jan. 23, 1869.

Sir: The report which I have the honor to transmit herewith is mainly my own work. At the time when I received my appointment as Commissioner of Mining Statistics, there was but a small remnant of previous appropriations left in the treasury which could be applied to the work with which I was charged. Preferring to go into the field as soon as possible, and prepare myself by personal observation for my task, I decided, with your approval, not to wait for the necessary appropriation, but to use the money already applicable, to enable me to see as much as possible of the districts within my department. I am happy to say that by the almost universal courtesy of railway, steamboat, stage and express companies, my expenses of travel were much reduced, and I was able, with the small sum at my disposal, to complete during the summer a journey of 13,000 miles. In this connection it is my duty especially to acknowledge the interest manifested in my mission, and the facilities put at my disposal by the Pacific Mail Steamship Company, the North American Steamship Company, the California Steam Navigation Company, the Union Pacific Railroad Company, the Central Pacific Railroad Company, and Wells, Fargo & Co.

The lack of means put it beyond my power to engage competent assistants, or even to employ a clerk for tabulating and calculating statistics. Obliged to do the whole work myself, I am nevertheless indebted to numerous gentlemen of the States and Territories I visited for their hearty sympathy and assistance, and feel bound to mention particularly the members of the California Academy of Sciences, Mr. Sherman Day, Mr. Titus Cronise, Mr. William Ashburner, and Mr. Henry Janin, of San Francisco; Messrs. Watt, Crossman, Lee, Merchant, and others, superintendents at Grass Valley; Messrs. Brumagim, connected with the Mariposa company; Mr. A. P. R. Safford, United States Surveyor General, Mr. Louis Janin, and Mr. Cæsar Luckhardt, of Virginia City; Messrs. Boalt, Stetfeldt, and Riotte, of Austin, Messrs. Eaton, Keyes, De Lacy, and others of Montana. Many of these gentlemen put themselves to trouble and expense to further my objects; some of them furnished me with valuable information, which will be found credited to them in the proper place.

Under these circumstances, the report now presented is necessarily partial. I have not attempted to make it comprehensive, at the cost of accuracy. It contains my own observations and such others as I have collected from perfectly trustworthy sources. Many papers promised to me, which I would be glad to have included in it, have not yet arrived, and as the writers are under no obligation but that which their own courtesy imposed, I cannot well hurry or blame them. The report is in two parts, the first containing such observations of the present condition of our mining industry as I could collect, and the second discussing at considerable length the subjects involved in the relation of the government to that industry.

The subject of methods and processes of mining and reduction I have entirely postponed, proposing to treat it in my next report with more care and thoroughness than would have been possible in the brief period, and with the limited means at my disposal last year. I hope to be able to present such a description and discussion of the different methods and apparatus used or proposed in this country as will be of practical value, not only as a means of determining the progress of the country in these respects, but also as a convenient summary for the benefit of the mining communities, and the great number of our citizens directly or indirectly interested in mining and metallurgy.

As my object has been to make a plain and simple statement, I have avoided, as far as possible, the use of technical or obscure terms, using only, I believe, such as can be found in the ordinary English dictionaries, or readily explain themselves from the context. There are also introduced a few sketches of underground workings, selecting such mines as were capable of being represented by simple profiles. These profiles are taken *on the plane of the vein*, (local irregularities being disregarded,) and show the quantity of ground already excavated, and the quantity remaining, either unopened or so far opened as to come under the head of "reserves," which includes the portions of a vein where "stoping," or extracting ore, may at once be commenced, the preparatory shafting and drifting (or opening of galleries) being complete. The Eureka mine, of Amador county, California, and the Social and Steptoe mine, of Egan canyon, Nevada, are examples, in which the amount of reserves, or ground opened in advance, is very large. Many of the Grass Valley mines are characterized by the same peculiarity, as the sketches show; and in this case, the prudence of the management is worthy of high praise, since the Grass Valley veins are narrow and hard, and the maintenance of large reserves is a matter of difficulty and expense. I ought to add that many mines of celebrity and interest are not represented by sketches, not because I desired to omit them, but because (as is the case with the Comstock mines) they could not be shown in simple profile, or because the expense of making the necessary measurements and drawings (in cases where none were accessible to me) was greater than I felt justified in assuming, or finally, because the character of the underground workings was so irregular and unskilful as to confer no credit upon the owners, and convey no instruction to the public.

The bullion product of the present year is more difficult to be estimated than that of almost any preceding one. The bullion tax having been abolished, the best source of knowledge on the subject is taken away. Wells, Fargo & Co.'s Express returns, which have hitherto been an important aid in estimating the movement, and thus the product of bullion on the Pacific coast, have lost their comprehensive character by the establishment of a rival express company (the Union Pacific,) the amount of the business of which is said to be considerable, but has not been, to my knowledge, thus far authoritatively reported. From the best authorities, and such official returns as I can collect, I estimate the product of the whole country as follows:

California,	$22,000,000
Nevada,	14,000,000
Montana,	15,000,000
Idaho,	7,000,000
Washington and Oregon,	4,000,000
Arizona,	500,000
New Mexico,	250,000
Colorado and Wyoming,	3,250,000
All other sources,	1,000,000
	$67,000,000

There is a decrease of $8,000,000* from the product of 1867, which showed a falling off of some $8,000,000 as compared with that of the year before. Montana, Idaho and Colorado manifest a satisfactory improvement; but there is a decrease of $5,000,000 from California, and $6,000,000 from Nevada, the latter being due to the exhaustion of many of the Comstock ore-bodies.

It is an instructive fact that the greater part of the product from deep mining is furnished by the same mines this year as last year and the year before, indicating that a more general adoption of systematic and economical methods would result in greater stability of production. The yield from placer mining must be expected to decrease, and its place must be supplied by the cement and quartz mines. The causes of the decrease in our production of bullion may be enumerated as follows:

1. The exhaustion of many surface deposits.
2. The reaction following on a period of excited speculation, and the collapse of numerous dishonest schemes.
3. The increasing and novel difficulties attendant upon the management of deep mines and the reduction of refractory ores.
4. The lack of communications, capital and knowledge, such as are required for the creation of enterprises based on the extraction and reduction of ores of low grade in large quantity—the only stable form of mining.
5. The vexatious and ruinous litigation which waits upon mining on the public domain, and which is most troublesome and expensive where mining is, in other respects, most profitable—thus operating to destroy those enterprises which have overcome other difficulties.

All these may be summed up in one sentence. Mining has been found in too many instances to be unprofitable; and the individuals who have lost money have retired from the business.

It certainly is not the duty of the government to give bounties to bolster up mining industry, if that industry is by the nature of the case an unprofitable one. Yet it cannot be denied that the decrease of the product of gold and silver in this country is a matter which particularly concerns the government at this time; and it may well be inquired whether the causes of it are remediable. I believe that time will remove many of them, and that the action of the government, based upon a just appreciation of its relations to the mining industry, will do away with the rest. Concerning the extent of our "mineral resources," the half has never been told; but those resources are but one factor, which must be joined with labor and intelligence to make the product wealth. When the industry of mining in these rich fields is based upon a foundation of universal law, and shaped by the hand of educated skill, we may expect it to become a stately and enduring edifice, not a mere tent pitched to-day and folded to-morrow. This industry has been the pioneer in our far western territory. It has founded States, attracted population, enlarged the boundaries of civilization; and it has done this great work in a lawless and careless way, without much regard to the future. All other parts of society springing from it, are gradually becoming systematized and consolidated, but the primitive industry remains in its primitive condition. Establishing everything else, it has not established itself. I believe that with the extension of the government surveys over the public domain, and the reduction of its vast area to order and law, the consolidation and definite adjustment of the mining interests will become imperatively necessary; and inasmuch as mining outruns all other activities in our new territories, and needs more than any other the aid of judicious legislation, I believe it should receive immediate attention. I may venture to hope that the views and suggestions contained in the following pages, based as they are upon much personal observation, experience and study, will not be without value to the government and the country.

Very respectfully, your obedient servant,

Rossiter W. Raymond.

Hon. Hugh McCulloch,
Secretary of the Treasury.

* Part of this apparent decrease may be accounted for by the item of $5,000,000 in Mr. Browne's estimate from "unknown sources," which I have reduced to $1,000,000.

Practical Letters.

[WRITTEN FOR THE JOURNAL OF MINING.]

VENTILATION.

REPLY OF MR. HARDEN TO MR. ROTHWELL.

[The controversy between Messrs. Rothwell and Harden has been prolonged to a great extent, but the subject is not yet exhausted. We hold our columns open for the presentation of new facts and arguments; but we regret to be obliged to say that minute hostile criticism, especially when requiring numerous citations from the letters already published in the Journal, does not seem likely to prove profitable to our readers. If Mr. R. says something of Mr. H., and Mr. H. quotes it and replies, and Mr. R. quotes his own original remarks and Mr. H.'s reply, in order to rejoin, the argument increases in volume at a frightful geometrical rate. This must be our apology to both gentlemen for cutting down, somewhat, their articles.—Ed.]

With that convenient belief which man has in himself, that his own trespasses are at most only venial, while the same in his neighbor he treats as unpardonable, Mr. Rothwell makes no hesitation in charging me with plagiarism of rather an extended character. He says your readers will find, in some papers of Mr. H. F. Mackworth, several of my articles word for word; and that I have given them under my own name, without sign or quotation, other than the remark at the close of one of my papers—"I will turn to the papers on experiments made there and describe them." Putting the most charitable construction upon this statement, the least that can be said of it is, that had he exercised but a little more care in reading, or controlled somewhat his imagination in writing, Mr. Rothwell might have saved himself from being betrayed into an assertion directly at variance with the truth.

What is the fact? Turning to my letter No. V., page 114, I find the following: "In support of his assumption of the superiority of the fan over the furnace, our friend has brought his examples from France and Belgium. I will then turn to papers on experiments made there, and describe the machines. This, at the same time, will bring out additional particulars for comparison; *in doing which, I shall be indebted to the report of a Commission of Inquiry by the British Government, and papers from other sources of experiments made for their information*, as were those of Mr. Wood and others on the jet and furnace. * * * Having some practical acquaintance with the Guibal fan, I shall reserve it for a more extended notice." The commission here alluded to consisted of Mr. H. F. Mackworth and Mr. I. Dickinson. I did not state *that* fact; yet, is it possible that Mr. Rothwell could have been misled by that omission, if such it can be called? Moreover, Mr. Mackworth's name does not appear at all in the report he alludes to, though it does in others; and the "*several* articles, word for word, as Mr. M. has given them," are part only of the letters in which the machines are described, more particularly numbers six and seven. Certain I am that no one of the Journal's readers ever supposed that I was describing the character and performance of all, or nearly all, the kinds of ventilators used in France, Belgium and England from my own practical acquaintance.

The efficiency of a ventilator, as I have in other words more than once repeated, is shown in the amount of air circulated in a given time, under a measured resistance, by a given unit of power applied; the power now discussed being the heat generated in the combustion of coal. It may be direct, as in the ascending column of heated air from the furnace, or transmitted, as in the fan, the air pump, the steam jet, or whatever machine the power is brought to bear upon. This principle is adduced and adhered to throughout my letters from the beginning, as only Mr. Rothwell, of all my readers, will have failed to comprehend. Yet he persists in telling them that I have made all my comparisons of the relative values without taking into account the "drag" to which each has been subject, thus creating for himself matter with which to disagree, and forgetting at the same time that the figures producing the result he challenges in the Bonne Esperance Fans, and the Verzy ventilator illustrate the contrary. He goes on to say that in making any comparisons between ventilators, the quantity of air circulated per pound of coal

can of itself prove no criterion of effectiveness—"since a machine may circulate 30,000 feet or only 3,000 per pound of coal, and in each case do the same amount of effective work;" but he might have added that in the case supposed, there must be ten times the resistance on the latter to that of the former; and that, therefore, a machine that can move 30,000 feet of air per minute per pound of coal under a given resistance, is ten times more effective than one which can move only 3,000 feet under the same conditions.

In a former letter I alluded to a suggestion made by somebody, somewhere, that "to arrive at a more conclusive test of their relative values, each power should be placed under precisely similar conditions experimented on at the same pit;" and remarked that "under some circumstances such a course would answer the purpose;" but I do not agree with Mr. ROTHWELL that the accidental conditions of the Pelton Colliery "afford just such another opportunity," for reasons given in my letter (page 162) touching the ventilation of that colliery.

We are told of Mr. JOCHAM'S experiments, that "they were both numerous and well conducted," but that those *I* gave from Mr. MACKWORTH'S papers "were the results of only a few of them." Of the five of FABRY'S ventilators experimented on, that gentleman says: "They are quite new (1853), fitted up in the best manner with horizontal cylinders and direct action;" and, as given in a former letter, page 146, we find the mean of the values of their effectiveness to be 58 per cent. of the power expended, or 87-100 less only than the highest mean of the latest experiments given by Mr. ROTHWELL from BUHAT. And it is from this set of experiments I obtain the mean of coal consumed per horse power, namely, 12.08 pounds per hour applied, and 21.17 pounds per hour utilized, and have used it in my computations in cases where the quantity has not been given by the narrator. Where it *has* been given, I have, of course, accepted it; and any variableness in this respect is, therefore, in the experimenter's narration of the facts, and not in my "suppositions." Turning then to the Bonne Esperance case, that cited by Mr. ROTHWELL in a former letter, page 354, we find it put thus: "revolutions 33 per minute, air circulated 18,500 cubic feet, drag 15 1-2 pounds per square foot, section of air courses 28 square feet, velocity of air 11 feet per second." Now, if anybody can fairly make more of this performance than I have done on page 130, dropping the fractions below half a horse in horse-power utilized, I stand corrected.

Neither have I taken the "VERZY," nor the amount of air circulated by it, as my "standard" of mechanical ventilators, as has been abundantly shown. Mr. ROTHWELL advanced that machine himself, as illustrating the superiority of the fan over the furnace; and to his own article I refer him, where he will find he has said "one of them (VERZY'S ventilators) erected at the Bois de Boussce Mines, exhausted 21,000 cubic feet per minute at the enormous drag of 24.6 pounds per square foot. The useful effect was, therefore, 16.6 horse-power. The high pressure engine used to drive it consumed five pounds of coal per minute. The return was, consequently, 3.32 horse-power per pound of coal, or more than double the exceptionally favorable return of the Hetton furnaces; four times the useful effect of the Tyne Main furnace." On reviewing this paragraph, it was shown that, while the ventilator utilized only 3.32 horse-power per pound of coal per minute, the Hetton furnaces were utilizing up to 6.42 horse-power per pound, and the Tyne Main 4.41; that, therefore, the furnaces were superior in their performance by the difference. In carrying the comparison beyond this with the first named furnace I fell into an error, which on resuming the subject with the Tyne Main furnace I detected and corrected, calling attention to it in a subsequent letter. Nevertheless, Mr. ROTHWELL, feigning to know nothing of this correction, or at least disregarding it, makes that error the subject of unrestrained comment, occupying more than the halves of two letters.

No one can fail to understand that where a steam engine is used, economy in it is economy in the purpose to which it is applied; and when I said that six horse-power per pound of coal per minute was nearly, as a rule, the performance of the engines of the English collieries, I stated what I knew to be a fact, and one that no assumption, based on the performance of those exhibited at the Paris Exhibition, will refute. There will be found exceptions among the pumping engines, and probably some (though very few) among the winding engines.

[TO BE CONTINUED.]

A Welsh Settlement in Kansas.

J. Mather Jones, Esq., of Utica, New York, has purchased between 70,000 and 100,000 acres of land in Osage County, Kansas, with a view of settling the same with his countrymen, the Welsh people. The tract is located about 30 miles south of Topeka, the capital of the State, and is a part of the well known "Sac and Fox Reservation," acknowledged to be the finest and most productive section of the State. It is underlaid with coal, is well timbered and watered, and is surrounded by settlements and cultivated farms.

Mr. Jones is a gentleman of enterprise, and is better known as proprietor and editor of the *Drych* (the Mirror) Welsh National newspaper, published at Utica. He was the chief promoter of the New Cambria Welsh settlement in Missouri, adjacent to the Hanibal and St. Joseph Railroad, which place has become thickly populated, and its lands are being brought into a profitable state of cultivation. The experience Mr. Jones has had in this and other enterprises, coupled with the fact that the coal has been proved to be of good quality, and produced at a very moderate cost, bids fair for his new undertaking in Kansas; and ever willing to help those who make an effort to help themselves, Mr. Jones does not hesitate to say he will advance money to such of those who need it.

Mining Summary.

GOLD AND SILVER.

[FROM OUR SPECIAL CORRESPONDENT.]

Nevada.

THE TWIN RIVER AND OTHER MINES—BELMONT.

AUSTIN, February 15, 1869.

I have just returned from a trip to Ophir Canon and Belmont. The weather was very cold, and it snowed terribly, so that it was anything but pleasant riding.

I found the workings of the Murphy full of water, the mill adorned with the Sheriff's and John A. Paxton's "ornaments," (*i. e.*, writs of attachment, tax-notices, etc.), and desolation and snow reigning silently but supremely.

It is an easy matter to criticize, but not so easy to carry on successfully a mining operation. I venture, however, a brief criticism on this case, with the hope of preventing in future similar *faux pas*.

I will premise with the remark that the operation was intended in good faith, and to be a success.

The first error was in placing the Twin River Mill upon the Canyon, as all the supplies had to be hauled up a very steep pitch for at least 1 1-2 miles. It should have been placed at the mouth of the canyon, and so relieved of this heavy expense; besides being rendered accessible for custom work.

It is an easy matter to haul down hill, and in Virginia, from ten to twenty tons of ore at one load. This seems "extravagant" but in this country of "beautiful distances," it is of everyday occurrence.

Moreover, water instead of steam power, could have been used to great advantage, and this fact must be considered more and more every year. Always use water power where practicable.

Again, a 10-stamp mill is ample for any of these camps, or can be made so by assorting the ore more closely, and leaving the second class for a "rainy days." Few mines here can do more than keep a good 10-stamp mill running 300 days in the year.

The second question in point of economy to be considered is the roasting of the ores. After crushing, a careful concentration of the pulp should be effected—then an analysis and then a careful roasting.

The usual method of effecting this latter process is by stirring for four to seven hours in the old furnaces. Whether this can be as effectually accomplished at cheaper rates is the question to be solved, and that quickly; for wood is becoming scarce, and consequently dearer. I am of the opinion that it can be done. The President of the Twin River Co. has always favored any improvement which would facilitate or cheapen the extraction and reduction of ores.

With this object in view, he caused one of the Stetefeldt furnaces to be built for trial at the works of the Company, and it is said by all who saw it that it was a success. By this process a saving of over 30 per cent. over the present cost of working is claimed.

Improved facilities for working ore at cheaper rates will treble the quantity of ores now worked, by making possible the reduction of those which will run from $50 to $75 per ton, and which are now thrown aside as useless.

One great drawback to the brilliant and immediate success in Ophir Canyon is asserted to have been the exclusive employment of Cornish labor.

"Cousin Jack" is a good "ground mole," but as slippery as an eel. He will "throw off" without coaxing; and as there were none but miners of this class employed, they had it all their own way.

It is said that the grossest imposition in shirking and loafing was practiced by these adepts in mining, who had a skillful system of espionage established, whereby detection by the mining captain or outsiders was almost an impossibility. I trust that if the Company resume operations, this friendly hint may be regarded.

The total amount of ore reduced in just 24 months, to Oct. 1, 1868, by this mill was, I am informed, 6,480 1-4 tons, averaging $101 51, and yielding $728,333 18 in gold coin. The debt is said to be only $59,000 in currency. Their assets are: A fine 20-stamp mill; hoisting works; several thousand cords of wood; the mine, already extensively opened; dwelling houses, etc.; and much personal property, which has been sold at the sheriff's sale for next to nothing—such as scales and assayer's apparatus, mercury, safe, etc., which can only be replaced at a cost of several thousand dollars.

Why are these operations allowed to be carried on? Is there a "ring" operation also?

The Murphy mine is not the only one in Ophir Canyon. There are others which show well on the surface, and I take the liberty of thus intruding upon the privacy of the Twin River Company, because their operations affect the mining interest of this section to a very considerable extent, and their failure or "stock-jobbing seriously retards the legitimate prosperity of all around them, and injures the reputation of mining generally.

The Buckeye mine, in Summit Canyon, three miles north, has had much work done upon it—enough to show it to be a very promising mine indeed. Some 200 tons have been woaked in the Mettacom, Manhattan and Twin River Mills. The average was excellent, viz.:

54 1-2 tons, from $17,849 44 to $327 51 per ton. 47 1-10 tons, from $7,182 97 to $152 50 per ton. 98 2-5 tons, under $100 and over $60.

There are also some 250 to 300 tons of ore on the dump. The superintendent is now east, to obtain a mill for the mine.

In point of fact, this range of mountains (the Foiyabe) is the finest in the state for permanent working (and the writer does not own a foot in it).

BELMONT.

The contrast between times in 1867 and in 1869 is very marked. Then all was hope—bustle—crowds surging to and fro—miners—prospectors—speculators—crowds in the streets, and all the varied phases of a new and lively camp. Now, as one rides in, he sees but "Sweet Auburn, loveliest village of the plains" all but the lovely. It seems as if the inhabitants had been suddenly swept away.

True, the Buel mill was working away, but the sound partook of the prevailing sadness and desolation. To complete the scene, winter had spread its pale winding sheet over everything.

But the day after my arrival I paid a visit to the mill of the energetic and courteous Col. BUEL. Here I found everything working evenly and smoothly. The mill was treating ore from the El Dorado South, and a fine clean up some $50,000 has since been made.

I successively visited the Arizona, El Dorado North and El Dorado South, Highbridge, Transylvania and others of lesser note, and finally, the mill of the Combination Co.

On the Arizona the lessees were taking out some good ore, as also on the El Dorado North. On the Highbridge parties were working on shares, and doing well, as also on the Transylvania.

The El Dorado South contains 1,000 feet, running north and south. It is owned by W. F. Leon & Co., who have taken out and sent to mill about 1,000 tons of ore, which yielded $150 per ton. There are four principal workings on the northern 500 feet—inclines from 130 to 260 feet deep. In all of them excellent ore is being extracted; and the fortunate owners may well feel satisfied with their lot. Masses of cerargyrite (horn silver) are disclosed in every direction. At the water line the ore changes to stetefeldtite, which will work two hundred dollars per ton. The assays run much higher. Such a mine in White Pine would create a sensation, and the proprietors would be over-run with proposals to purchase.

Belmont is very favorably situated—in a "bowl" near the summit and on the western slope of the mountain. Not far from the main town is the mill of the Combination Co. It has 40 stamps, and is a very costly structure. It is not now running.

A plain, substantial 10-stamp mill, with furnaces, would have been running to-day, and Belmont would have been what its mines entitle it to be—a first-class mining camp. However, if the present superintendent is properly supported, he will carry out a very effective campaign this summer, by thoroughly opening the copper mines. The debt of the Company in Belmont is trifling and their mines are of undoubted value. In the meantime the state of things is very discouraging to the stockholders—but if they give way now, their property will fall, at a trifling price, into the hands of others, who will earn cheaply a great success. Many companies have thus "weakened" when they were finally on the right track. I hope the Combination will not.

The news from Pahranagat is about the same as it has been for two years past. Reveille and Hot Creek ditto.

San Antonio is in a "financial difficulty," but we only know that the sheriff attached it for $11,000 currency.

The snow has somewhat diminished the swarms of people who were to be seen going through here to White Pine, but in the spring the fever will be as great as ever.

As it may be a matter of some curiosity, allow me to forward you a list of the companies in White Pine, as far as they have been made public. The collection of these names has cost much patient labor.

Names of Companies	Capital Stock.
Consol Eberhardt Mining and Milling Co	$10,000,000
Consol Chloride Flat	5,000,000
Eclipse Chloride Flat	5,000,000
South Aurora	2,400,000
Monte Christo (N. Y.)	2,000,000
Original Hidden Treasure	1,600,000
Cinderella	1,600,000
Lexington	1,600,000
Aurora Consol	1,600,000
South Virginia	1,600,000
California	1,500,000
Cayuga Chief	1,200,000
White Pine Mutual Mill Co	1,000,000
White Pine Water Co	1,000,000
White Pine Mining and Milling Co. (Phila.)	1,000,000
Phil. Sheridan	1,000,000
San Francisco and Treasure City	1,000,000
San Juan and Treasure City	1,000,000
Eastern Slope Tunnel Co	1,000,000
Wells	1,000,000
Hidden Treasure	800,000
Pocotillo	800,000
Virginia	800,000
Holcombe	800,000
San Francisco and White Pine	600,000
Treasure Trove Consol	525,000
Chloride Mountain Tunnel Co	500,000
Dolomite Consol	500,000
Bradt Mining Co	500,000
Knox Tunnel Co	400,000
Featherstone	400,000
Palmer	400,000
Douglass	320,000
Ida	320,000
Bismarck	200,000
Magenta	140,000
Teese and Peck	100,000
White Pine Smelting Co	50,000
Scott Prospecting Co	18,000
Silver Point	
Coover's 5-stamp Mill	
L. B. Moore & Co., 8 stamps	
Total	$51,273,000

All of these companies, with two exceptions, are of San Francisco parentage.

QUARTERLY RETURNS OF MINES IN LANDER COUNTY.

The Austin *Reveille*, Feb. 8, has the following:—"We give below the returns of mines in Lander County, which produced bullion during the quarter ending December 31, 1868, as gathered from the rough notes of the County Assessor. The rough list from which we obtained our data contains 126 sources from which bullion was obtained, but the names of only 50 mines or companies are specified; the larger proportion is credited to the name of the person that sent the ore to the mill. All lots of ore less than one ton, of which there are several in the list, are omitted in the table.

Mine or Company.	Tons.	Pounds.	Av. pr. T.
Chase	6	1,696	$222 98
Florida	21	1,344	294 20
Magnolia	8	1,472	429 61
South America	70	1,777	300 34
Maggie	13	1,216	138 07
Harding & Dickman	5	82	832 84
Yankee Blade	8	390	280 13
Troy	14	404	266 96
Lane & Fuller	209	620	233 83
Eureka Company, Eureka District	2	838	134 93
Esther	17	1,224	218 64
Diana	10	1,342	147 32
Washington	6	490	344 86
St. Louis, Cortez	25	1,522	620 61
Chihuahua, Newark	69	1,725	122 70
Manhattan Co	483	874	188 23
American Co	50	1,146	371 61
Eberhardt, W. P	476	1,749	774 00
Keystone, W. P	80	90	554 00
Santa Rita, W. P	26	....	224 00
Hidden Treasure, W. P	80	1,990	337 00
Snowdrop, W. P	8	887	547 61
Aurora South, W. P	377	1,838	145 09
Aurora North, W. P	4	1,012	510 66
Hudson & Logan, W. P	3	1,630	371 44
Stonewall, W. P	68	257	434 06
Romulus, W. P	8	213	272 72

Montrose, W. P.	24	1,724	87 24
Eclipse, W. P.	18	1,216	435 28
Last Chance, W. P.	18	1,315	813 51
Argyle, W. P.	10	1,040	58 52
Highland Chief	2	1,000	168 28
Best Chance, W. P.	1	622	181 92
Buena Vista, W. P.	1	404	91 85
Montgomery, W. P.	17	1,585	323 52
Charter Oak, W. P.	1	211	103 88
Robert Emmet, W. P.	172	902	357 77
Glazier, W. P.	6	1,658	170 97
Indiana South, W. P.	8	1,101	160 81
Indiana North, W. P.	3	187	344 77
California, W. P.	5	1,121	280 07
Palm, W. P.	6	1,995	126 39
Empire, W. P.	4	600	1,007 37
Genesee, W. P.	6	1,738	464 12
Stamboul, W. P.	2	1,354	221 15
Emersley, W. P.	8	1,547	464 83
Seymour, W. P.	8	1,547	327 07
Delmonico, W. P.	9	648	87 95
Eunice, W. P.	9	163	116 85
Hidden Treasure, Ex.	14	470	186 36

"The number of tons of ore reduced in this county during the quarter amount to 2,687, which is greater than the product of any previous quarter. Its total value is $937,904 64, which gives an average of $348 53 per ton—the computations being in currency. Both product and average are larger than ever before, by reason of the amount of ore of a high grade which was produced by the mines of White Pine. The yield of this immediate district of Reese River is greatly below that of several years previous: a few companies only are working their mines, and the numerous miners who were engaged in extracting chloride ore from the surface of Lander Hill have gone to White Pine. During the quarter the Manhattan Company produced only 483 tons, which gave an average of $183 23 per ton; the Lane and Fuller 209 tons, averaging $233 83 per ton; the South American 71 tons, averaging $300 34; the American Company 50 tons, averaging $371 61 per ton; besides a number of smaller lots, in which the item of 5 tons from the Harding and Dickman, averaging $832 24 per ton, is noticeable. The Chihuahua Mine of the Centenary Company, in the Newark District, produced 70 tons, averaging $122 70 per ton; and the St. Louis Mine, in the Cortez District, produced 25 3-4 tons, which gives the fine average of $620 61 per ton. The conspicuous and interesting feature of the table is the returns from the mines of White Pine, as regards the number of mines which produced ore, the large quantity of ore reduced, and the great average yield per ton. It will be seen that the Eberhardt produced 477 tons, of the average of $774 per ton; the Keystone 80 tons, averaging $554 per ton; the Hidden Treasure 81 tons, averaging $337 per ton; the Robert Emmet 172 tons, averaging $357 77; the Stonewall 68 tons, averaging $434 06 per ton; the Aurora South 378 tons, averaging $145 09; and so on. White Pine is credited with 33 mines which produced bullion, besides considerable lots which are entered in the names of individuals. This slipshod manner of making the returns of the mines which produced bullion in any given quarter, lessens the value of these tables. If the assessor would observe the form of the return prescribed by the statute, which is as simple certainly as the worthless one pursued, his data in relation to the mines in his district would be of great value. There is a perversity about the incumbents of that important office which it seems impossible to overcome or correct."

The Comstock.—Following is the report of the Superintendent of the Ophir Mine, for the week ending January 29th:—"Ore extracted, 919 tons; ore forwarded to mills, 1,055 tons. The ore sent to the mills was extracted from the following points: Blue Wing Stope, 706 tons; do. Cut, 349 tons. Stope samples assayed $41 30 per ton; Cut do., $26 20 do. At Blue Wing Stope all faces are in hard blasting quartz, causing more expensive mining and diminishing the quantity of ore. In portions of the Stope the ore is getting too low in quality to justify further working. No variation is noticeable in ore from the cut. Much surface earth has to be removed, and the grade of the ore being low, work will be suspended at this point, and this section worked from new tunnel. New Shaft—no charge of an encouraging nature have occurred in lower levels of this work. Drift at 920-station is in 120 feet; drift west at the 1,100-level is 64 feet long. Have about 64 feet more to make to reach the west wall. Bullion shipped on the 29th, $14,509."..... A letter of the 1st of February says of the Hale & Norcross mine:—"The face of the south breast, going north on the ground floor, looks well. The ore is six or seven feet wide. Above, on the second floor, is wider, and there is very little waste in it. We have had so much water in the south end of the second floor that it has interfered very much with working south on that floor and on the ground floor. In the north, we are coming in to where we ought to have the ore, and we have a little ore to-day in the face of the drift, with considerable water, which rather impedes our progress, but in a few days we will start a breast north. In the winze the ore is about two and a half to three feet wide. There is a small clay seam on the east, which I intend to cut through with a small cross-cut, to see if there is not ore on the east side of it. This winze is about 100 feet from our north line, and very nearly over where we have the ore in the north drift on the 4th station, but further west. As soon as the sump is finished we will then commence opening the 5th station." A letter of the 2d says: "The ground floor north in south breast shows more waste than it did yesterday. Have not yet got into the face of the south drift. In the north they have some little ore west of where we crossed the ore with the cross-drift. The sump was finished this evening."....From a Virginia paper of Feb. 27th we extract as follows relative to the Belcher mine:—"Reports from the mine are of the most flattering character. Persons who should know assert that a body of ore six feet wide and assaying on an average upwards of $90 per ton, has recently been cut through. The point at which this body of ore is said to have been found is between the 300 and 420-levels, to the southwest of the shaft. The indications are promising, as we are informed, for the development of an extensive deposit of high grade ore at this point assays having been obtained from car samples running as high as $124 per ton. On the 30th inst, on the 200-level, east of the shaft, they cut into a body of ore six feet wide, average assay $60 per ton." A letter of the 1st says: "They expect to get into the drift to-morrow. The 300-level continues to look good. In the 335-level have a good deal of water to contend with. On the 429-level have got through the body of water....Gold Hill quartz receipts for January, $6,956 42....On Feb. 1st the drift on the 1,000-level of the Imperial was in 45 feet from the shaft, the ground continuing to get softer as they approach the vein. Receipts for January $46,728....At the Segregated Belcher fifty tons of ore produced $2,016 52, being an average of $40 32 per ton. Monday last they commenced hauling ore to the mills....On Feb. 29th, Badger tunnel, of the Amador mine, was in 32 feet, the vein being 40 inches in thickness and looking well.

White Pine.—A survey has been made for a steam tramway from Hamilton to Treasure City by John A. Paxton, John W. Coleman and others. The White Pine *News* says:—"The enterprise is perfectly feasible, and will undoubtedly be of great benefit to this city, as also a good investment for its projectors. We are informed that the work will be commenced as soon as possible. The starting point at Hamilton will be Mill street, and follow the slope east of the Virginia mine to the top of the hill east of the summit; hence through Treasure City, on Main street, beyond Chloride Fat. They propose to do a general transportation, including ores....We visited the town of Silver Springs a few days ago, and were surprised to see the progress that has been made in the past six weeks in building up the city there. It is a busy and prosperous town with a promising future before it. Water and fuel being abundant, and plenty of good mines in the immediate vicinity, its citizens are warranted in anticipating a rapid growth and permanency for their favored town."

Silver Bend.—"The mill of the Belmont Company," says the Montana *Champion* of Feb. 13, "last week finished a six-weeks run on ore from Leon & Co.'s El Dorado South, and 'cleaned up' on the 7th inst. The run comprised 343 tons of ore, which yielded 58 bars of bullion, weighing 53,605 ounces. It will be seen that the mill, which has a battery of ten stamps and four roasting furnaces, reduced upwards of eight tons per day for the run of six weeks, which is a very handsome average. The product of the ore is in round numbers about $50,000. The El Dorado South has been under the management of F. W. Leon for nearly a year, and the *Champion* compliments him as an experienced miner and thorough practical business man. The splendid mine has been well worked and has yielded substantially."

Indian.—The Humboldt *Register*, Feb. 12, says:—"The Grant mine, in Indian District, one of the oldest and most promising localities in the county, stands to-day a promising rival to the Arizona in richness and extent. Recent explorations on the vein have been very successful. Large bodies of ore of superior quality have been discovered in the shafts and drifts of the mine, tons of which are now on the dump awaiting a favorable opportunity for reduction. Several tons of the ore, reduced at the Palmer mill recently, yielded upwards of $100 per ton."

Idaho.

The silver City *Avalanche*, Feb. 20, has the following record of the mines on Warlagh Mountain:—"The Ida Ellmore is being rapidly put in order. The south shaft, which was sunk by contract a depth of 100 feet, is about completed; men are now employed in cutting it out wider than was done under the original contract; it is being well and substantially timbered; hands are also engaged on the north shaft, which is down a considerable depth. A new level will be commenced in the south shaft in a few days, and it is only necessary to add that the lode continues as wide and as rich as ever. The Golden Chariot is yielding large quantities of ore at this time, which has diminished none in the richness of quality. A number of teams are constantly employed in transporting the ore to the New York Mill, where it is crushed. A force of 70 men is now employed. The Poorman looks more permanent, and is in better working trim now than at any time since its discovery. The ledge ranges from 1 1-2 to 3 1-2 feet in width and is producing an excellent quality of ore. The new hoisting machinery works well. There is quite a pile of ore in the dump, and several teams are employed hauling to the mill. The Peck & Porter Mine is developing well, the ore resembles that of the Ida Ellmore and Golden Chariot. We were shown by Mr. Peck a large specimen extracted from the mine literally specked with gold. It is certainly one of the handsomest samples of quartz we ever saw. The Baxter Mine, we learn, is also turning out well. Mr. Catlow informs us that the shaft is now down to a depth of 190 feet, and the lode is growing wider as it goes down."....The Silver City *Tidal Wave* has the subjoined intelligence:—"The amount of bullion assayed in Owyhee County during the month of Jan., 1869, as returned to the Assistant Assessor of Internal Revenue is shown by the following statement:

Blake & Co., gold	$39,090 65	$52,120 87
" silver	27,711 08	36,948 10
	66,801 73	89,068 97
McDonald & Co., gold	37,197 72	49,596 96
" silver	11,803 94	15,738 59
	49,001 66	65,335 55
Total	115,803 39	154,404 52

CHAS. HILTON, Assitant Assessor Int. Rev.

"In the above statement the amount produced by the Rising Star Co., at Flint, is not included, as they ship their bullion directly to San Francisco for assay, and are not required to make any return to the Assessor....We have recently been shown several pieces of gold-bearing quartz of marvellous richness from Peck & Porter's mine. The ore is similar in appearance to that of the Golden Chariot and Ida Elmore, consequent of being situated on the same belt or range of quartz....I. W. Greenwell is engaged in developing another mine immediately south of Peck & Porter's claim, on the same lode. Encouraging prospects are obtained....Operations have been resumed on the Minnesota. The north shaft is now down 80 feet on the vein, which is yielding quartz that will doubtless pay largely for working."....A correspondent says:—"I have just returned from a visit to the R. S. Mill, and feel full confidence in the success of the structure. Everything works beautifully, and they are daily improving the working of the ore. Mr. Hall, the newly-arrived superintendent, seems to be a very pleasant and energetic gentleman—he is everywhere, and everything is conducted under his immediate supervision. He informed me that another plan would be set to work this week, when they will be able to work 18 to 20 tons daily. The rock in the ore house is exceedingly rich, in fact so rich that it has to be mixed with an inferior class of ore to save the mineral more easily. At the Assay office where the gentlemanly Mr. Meyer presides four bricks were cast during my visit, averaging 50 pounds each. The average yield of the mill as near as an outsider may be supposed to know, is about 170 pounds of bullion, worth from $15 to $17 per pound, or from $2,000 to $3,000 daily."....A correspondent, writing from South Montana, says:—"The Original, one of the first ledges discovered there, bids fair to be one of the best and most extensive yet discovered in this county. It is 44 feet in width, and can be traced on the top of the ground for a distance of four miles. The rock has assayed at the rate of from $366 to $500 per ton. The casing of the ledge is said to be as smooth as glass. There are other mines in the district equally as good as the Original. South Mountain, in which those mines are located, is about 30 miles south, from Silver City, near the line of the Camp Winthrop road. Timber and water are abundant in that section."

Arizona.

The Prescott *Miner*, Feb. 6, has the following account of the new discoveries at Black Canyon.

"Mr. Behman, and four other miners, who own a bar in Black Canyon Creek, Bradshaw Mining District, left there Sunday last and arrived in Prescott on Tuesday. The news brought by them is highly encouraging. Three of the seven companies now at work there were sluicing when the party left the creek, and making from eight to twelve dollars per day to the man. The other companies were cutting ditches, making sluices, and otherwise preparing for work. The bar owned by Mr. Behman and company is on the south side of the creek, or rather river, about one mile below Montezuma bar. Before coming here for provisions, etc., the company prospected it thoroughly, and Behman imformed us that he would not board a man who could not make ten dollars a day in it. We saw several prospects which he had carefully kept separate—the poorest of which was 18 cents out of two pans. There is one channel in the bar, the dirt of which prospects 40 cents to the pan. Having mined and prospected in Black Canyon, and never having found such flattering prospects as these, we were not disposed to believe Mr. Behman's story, but his partners who are old miners and know all about gold and gold diggings, backed him in his assertion, and we now believe every word he said. Besides the statements of the Behman company, we have the word of Dr. J. T. Alsap, who is now at the mines, for stating that the mines are richer than we had thought them to be. In a letter to Henderson & Co., of this place, Mr. Alsap says: "I am satisfied that there is gold in paying quantities here. The miners here seem to have the most unbounded confidence in the diggings. The largest nugget found yet on the creek weighed two dollars. The Indians stole two horses from a French company below here the other day. I have not seen any. I have just heard that the French company above me have cleared up ten dollars per day." This is cheering news from that quarter, and, we seriously believe that there is not on the Pacific coast richer or more extensive diggings than those of the Bradshaw District, and now that a wagon road has been found, the cost of living there will be reduced; others will go there and much gold will be taken out.... The companies engaged in placer mining in Big Bug district, are making from five to ten dollars per day to the man; those on the Hassayampa are also doing well. At the Placeritas, near Walnut Grove; at Weaver, and near the Vulture mine, placer mining is being carried on, and we learn that those engaged in the business have been and are doing well. Three weeks ago, miners were fearful that we were going to have a dry winter, but their fears were groundless. The streams are now full to the brim with water; the mountain gorges are packed full of snow; the foot-hills are covered with from four to six inches of the watery element, and the valleys and mesas resemble swamps, judging from which we may safely count on having plenty of water until the middle of June next, when very likely, placer mining will have to be suspended until the summer rains set in. ....The same paper says of Quartz Mining in Walker's district—"Messrs. Fleury, McCracken and Harvey came to town, from the Eureka mill, head of Lynx Creek, Wednesday last, through snow from six inches to four feet in depth. It was as much as the party could do to make town, and had it not been for Mac. and Peter, Mr. Fleury, who is unaccustomed to mountain life, could not have succeeded in "reaching port." We called upon Mr. Fleury yesterday evening, and found him very stiff indeed, from the effects of the trip. He informed us that about 20 tons of refuse rock had been crushed, but owing to the intense cold, which prevented amalgamation in the amalgamator and the arastras, they were unable to get the gold together. As soon as the weather moderates sufficiently to admit of working, it is his intention to run the mill, day and night, upon a large lot of Tie-Tie ore belonging to N. A. French....Owing to the departure of Charles Borger for San Francisco, all work (except tunneling) has been stopped at the Sterling. We learn that it is the intention of Mr. Borger to bring with him ten or fifteen more stamps for the mill, besides other machinery, acids, etc., for chlorination.....Work on the Chase Tunnel is steadily progressing, and we are informed that the mine is growing wider. Should the Nolf process, a description of which we publish elsewhere, prove a success, it will knock chlorination cold, and revolutionize mining in general."

Utah.

It would have been strange if White Pine had remained the exclusive mining rage of the day, and therefore we are not surprised that a counter-excitement should be raised in some direction. The following extract from the Salt Lake *Reporter* (Gentile organ) of February 2, is probably the first low note of a strain that ere long will swell in volume, and attract crowds of adventurous prospectors Utahwards:—"We had the pleasure of a call yesterday from C. D. La Baume, of Promontory City, who reports a lively excitement there over the newly-discovered gold diggings 40 miles west. Mr. La Baume found the placer diggings on the south side of Raft River Range to be very rich, yielding 30 cents to the pan on 'bed rock,' with fine gold all the way through the gravel, of good prospects. It is about five feet to the 'bed rock.' These diggings are about 10 miles from the nearest point on the railroad line, and lie along three streams known as Indian Creek, Dove Creek and Sagebrush Creek. These creeks rise in the Raft River Range and run towards the south, but are lost in the desert before reaching Salt Lake. Raft River Range is not laid down on most of the maps, but extends east and west from Bartram's Peak, which is the main point in the range. The placer diggings lie nearly midway between the Peak and Spring Bay, the most northern point of Salt Lake. The creeks mentioned will furnish enough water for only four or five months in the year, and we are not informed what facilities exist for a better supply, but as the mines are very rich it will probably be found. Clear Creek runs along the northern side of the range, and there are quartz mines in the mountains, though little is yet known of them. Many parties are preparing to 'go in' as soon as the snow will allow them to work, and we confidently expect a lively mining town considerably nearer than White Pine."

COAL AND IRON.

Pennsylvania.

The Carbon *Democrat*, Feb. 27, has the following on the progress of the Nesquehoning Railroad.—"The letting of the contract for the grading and masonry of this road (about twenty miles in length) took place on Saturday, the successful parties being Thomas and Philip Collins, a heavy contracting firm, noted for energy and success in building railroads. The Nesquehoning Valley Railroad runs from Mauch Chunk into the Mahanoy coal basin, in an air line, and will be an important feeder to the Lehigh Coal & Navigation Company's canal and railroad."

LEAD.

New Hampshire.

The Madison, N. H., lead mine is said to be worked with very profitable results. A lump of ore weighing four hundred pounds was taken out a short time since. The original company employs ten hands this winter, but will probably require a hundred next summer. A new company has bought an interest in the mine, and commenced operations a short distance from the original one.

The Proposed Tunnel Between England and France.

Mr. H. Beckett, F. G. S., of Wolverhampton, the gentleman appointed by the Governments of Great Britain and France to report upon the possibility of effecting a communication between the two countries by a submarine tun-

nel under the Straits of Dover, presided at a recent meeting of the Dukley Geological Society, and read a paper on the scheme. Mr. Beckett commenced by referring to the former plans proposed to obtain the desired communication, and then pointed out with great clearness the character of the various beds of chalk and marl on the English coast opposite to France. He showed from their undoubted indentity with the measures exposed on the French coast that the opinion generally agreed upon among geologists that the two countries were at one time united, was based upon reliable principles. The reader then pointed out the shallowness of the water between the two countries, as shown by the Admiralty charts, and argued from the "dip" of the beds, which was uniform on both sides of the Straits, that the proposed tunnel would not have to traverse "faults," but on the contrary, the whole would be through the same cretaceous bed. This bed could be easily worked, was free from fissures and joints, and was to a great extent impervious to water. Mr. Beckett said the promoters of the scheme proposed to drive two parallel tunnels for a single line of rails, and were of opinion that the total cost would be considerably less than £10,000,000 sterling.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

COPPER—ITS SOURCES THE METHODS EMPLOYED FOR REDUCING ITS ORES.

BY DR. LEWIS FEUCHTWANGER.

Copper and its alloys are of the greatest importance in the arts. A few remarks in regard to some of the less generally known alloys may not be out of place. Prominent amongst these is Muntz metal, which for the last thirty-six years has been in use for sheathing the bottoms of ships and other vessels, and which has entirely superseded pure copper. This alloy is composed of 56 per cent. copper, 44 per cent. zinc and 44 per cent. lead; it is cast in ingots and rolled while hot into sheets, which when finished, are pickled in dilute sulphuric acid, and afterwards washed in water. It keeps the bottoms of ships cleaner and costs much less than copper sheathing. The bronze powders which are so extensively used for coloring objects cast in brass, also for bronzing casts of plaster, as well as for various other ornamental purposes, are prepared by triturating Dutch metal, or other alloys of copper, zinc, etc., between rollers with water and resin, oil or fat; separating the finer particles from the coarser, by elutriation, sifting, etc., and lastly drying and heating them.

It may here be stated that brass is frequently colored or bronzed after dipping in dilute sulphuric acid, and before lackering; it is done by immersing the article in a solution of arsenious acid in hydrochloric acid; by applying a dilute aqueous solution of chloride of palladium or platinum, or an aqueous solution of corrosive sublimate mixed with vinegar, or by rubbing plumbago over the surface. Either of these applications produces a dark gray coating, which assumes a bronze tint when laquered.

The ores of copper are very numerous, though the number employed in the arts for the production of metallic copper is comparatively small. Among the most interesting native combinations of copper may be mentioned a black copper ore, which is a native black oxide; the blue copper ore, or, as it is called, the azurite, or blue carbonate; the emerald copper ore, known by mineralogists as dioptase; the gray copper ore, known as tetraherite; the green copper ore, the well-known malachite; the indigo copper ore, which is a native protosulphide; the octahedral copper ore, which is the native red oxide of copper; the red and white of Cornwall, in England, of Siberia and California; the variegated copper ore; the velvet copper ore, which is a native sulphate of copper and aluminium, and called by mineralogists lettsomite; the yellow copper ore, which is the common copper pyrites; the purple copper known by mineralogists as erubescite, is a variegated copper, yielding 58 per cent. copper. The Cuban, a native sulphuret of copper, from the Island of Cuba; the wolfsbergite and bournomite, an antimonial copper, found in Germany in the Hartz Mountains, Spain, France and England; the wolchite, likewise an antimonial copper glance, from Carinthia; the tennantite and thorite sulphides of copper; the wittichesite, a bismuthic copper ore, from the Cobalt mines in Baden, Germany. The tenorite, dorneykite and silenide of copper, and many more native copper ores.

It has already been stated that copper occurs not only in the metallic state, but also as oxide, chloride, carbonate, phosphate, sulphate, silicate, arsenate and vanadate. As sulphide, either alone or combined with the sulphides of other metals, as in copper pyrites, purple copper and vitreous copper ore, the erubescite and tetrahedrite. It also exists in from 1 to 2 per cent. in many specimens of meteoric iron, as it is as widely distributed in nature as iron, though less abundantly. The principal materials used for extracting the metallic copper are:

1. The oxides, particularly the red oxide, which is found in extensive veins in Australia, Cornwall, Chili, France and California, yielding when pure, 88 to 78 copper.

2. The black oxide which, on the discovery of the Lake Superior Mines, was found profusely at Keweenaw Point, in veins in conglomerate rock, and contained 79 to 82 copper.

3. The sulphide, vitreous, or gray sulphide of copper, which occurs frequently in Cornwall, and contains 80 per cent. copper and nearly 4 per cent. iron.

4. The purple copper, which is also sulphide, and is divided according to the percentage into three classes, such as the 58, 64 and 70 per cent. ores. Large veins of this ore occur in Cornwall, Sweden, in the British Provinces, and several other states.

5. The copper pyrites or yellow copper ore; this is the most abundant ore of copper, averaging 35 per cent. copper, is found in large quantities in Cornwall and Devonshire, in Sweden, Cuba, South America, in the United States, in a hundred localities, from Vermont, the extreme eastern boundary, to Calaveros County, California, the southern extremity. 200,000 tons of this ore are annually consumed for the production of metallic copper.

6. The gray copper ore, or as it is called by mineralogists, fahlerz, which according to percentage of foreign metals contained in the ore, varies from 30 to 50 per cent. copper; most of them contain silver, some as high as 30 per cent. silver, while the copper is only 15 per cent. This ore is quite abundant on the Pacific slope, in the United States, such as Nevada, Arizona, Montana and Idaho, as also in Mexico.

7. The atacamite, is a native oxychloride of copper from Peru and Chili.

8. The chrysocolla is a native silicate of copper, found abundantly in the United States.

9. Copper slate, which forms in Mansfeld, Prussia, quite an extensive deposit; it is a black slate, containing copper pyrites, bitumen, cobalt, nickel, silver, etc.; is also found in Pennsylvania. All these enumerated native ores are used more or less for the extraction of metallic copper.

The process of copper smelting is in general very simple, for by roasting the ore with the view of disengaging the sulphur and then smelting it with charcoal in a blast furnace, which the writer saw in 1864 performed in Copperopolis, California, where 130 tons roasted ore was mixed with 68 tons charcoal, and exposed to the greatest heat of a blast furnace, which produced a matt or copperstone of a good percentage, and which was exported in that state to Europe, for refining and making it into regulus and thin sheet copper. Just as simple is the process of refining the oxides and carbonate of copper, at Chessy, in France, where the ores consist of the carbonate and oxide of copper, and in Siberia at the copperworks, and in the Ural. The ores consist of native copper, with quartz and magnetic iron ore, malachite, and red and black oxide of copper. These ores, with the copper pyrites, are smelted in blast furnaces fed with wood, and an impure copper, called black copper, is obtained, which is afterwards refined with sulphureted copper ores, containing, besides copper and sulphur iron, silica and other impurities The process is more complicated. It requires the addition of slags and other fluxes, if the ore does not already contain a sufficient proportion of silicates; ore melted either in reverboratory or in blast furnaces; during this operation, the oxide of copper formed in the roasting is reconverted into sulphide while the iron which remained in the roasted ore as sulphide, passes to the state of oxide; a slag is then formed, containing the greater part of the iron in the ore and a sulphide of iron and copper (cupreous matt) containing the greater part of the sulphide of copper in the ore, and a much smaller proportion of iron. The coarse metal is now again roasted or calcined, and the roasted product again fused with the slags of other operations, frequently also with the addition of oxydized copper ores. This operation yields a second slag, containing a larger proportion of iron, and a second regulus, containing a still larger proportion of sulphide of copper than the first, and by repeating these calcining and melting operations a certain number of times, varying according to the nature of the ore and the construction of the furnaces, a regulus is at length obtained, consisting almost wholly of sulphide of copper. Now when this compound is roasted with free access of air, the first result is to oxidize both the sulphur and the copper, the sulphur mainly going off as sulphurous acid, so that after a while there remains a mixture of sulphide and oxide of copper, which compounds at a certain temperature, decompose each other in such a manner as to yield sulphurous acid and metallic copper; the product of this operation is a regulus of metallic copper, varying considerably in purity according to the particular series of operations to which it has been subjected, and is known as coarse copper; this, lastly, is subjected to the refining process which is more or less complicated, according to the degree of purity of the coarse copper.

In South Wales, copper smelting has been extensively carried on since the 17th century, and Swansea is the location of the most extensive works in the world. To this point all the copper ores are brought from the neighboring counties, as well as from Cornwall, Devonshire, Spain, South America, Australia, Africa and the United States, and there they are smelted and refined. A large number of vessels laden with copper ores are daily landed at Swansea, and the prices are in general arranged so as to be in favor of the smelters. In Swansea there are five classes of ores used for smelting, and the operation is performed in reverberatory furnaces.

1. Sulphides of copper mixed with a large proportion of of sulphide of iron, and only a very small quantity of oxidized copper compounds, where the gangue is formed of quartz and earthy matters, and the proportions of copper from 3 to 15 per cent.

2. The copper pyrites containing from 15 to 25 per cent. copper.

3. Copper pyrites containing very little iron pyrites or any other substance hurtful to the quality of the copper, but a larger proportion of oxidized copper compounds.

4. Rich oxidized copper compounds and copper pyrites, and quartz ore gangues, the proportion of copper 25 to 45 per cent.

5. Richest copper ores, containing 60 to 80 per cent. copper in the metallic state, and an oxide and carbonite, like the Chili ores.

At those works the reduction is easily effected by the judicious admixture of the several varieties of ores, with a plentiful supply of oxides or carbonates to be mixed with the sulphides at a certain stage. The number of operations from the first calcination to the refining may be reduced to 6, but when they contain sulphurous ores, 8, 10 and even 12 operations may be required.

The 1st process is the calcination.

2d. Melting of the calcined ore in the reverberatory furnaces with a fuel consisting of two parts of anthracite and one part bituminous coal.

3. The calcination of the granulated coarse metal.

4. The melting of the calcined coarse metal, in which process a regulus is formed, and is called *white* metal, which contains an average of 74 per cent. copper, but if it contains much iron it is called *blue* metal.

5. Roasting of the white or blue metal, by which operation the sulphur, which had hitherto been retained in union with the copper as an agent of concentration, is finally expelled in the form of sulphuric acid, and at the same time certain foreign minerals, such as arsenic antimony, iron cobalt, nickel, tin, etc., are removed by conversion either into volatile oxides or into silicates, which pass into the slag. All this is performed in the same reverberatory furnace, which is similar to the melting furnace, with the exception that it has no doors or openings for the admission of air.

6. The last process is that of refining, which has for its object the removal of the foreign metals and the remainder of the sulphur.

The Swedish process of smelting copper ores in blast furnaces consists of three operations, such as the roasting, the fusion, and roasting of the regulus.

The Mansfeld process for reducing the copper schist or argillaceous slate, impregnated with copper, is the most complicated process, because it contains many metals and a large proportion of silver, which has to be saved by the eliquation process. Copper is also extracted in the wet way, by what is called the cementation process, which is practised in localities where sulphate of copper has been formed in mines in which copper exists as sulphide, and thereby formed by the oxydation. The precipitation is effected by wrought iron, and is accelerated by agitation, which has the effect of loosening a basic iron salt which adheres to the surface of the metal, thereby exposing a fresh surface. The precipitated copper is then melted and refined. The same process may be simplified by the use of a voltaic battery,—the copper being likewise obtained in more coherent form.

The purest metallic copper, suitable for chemical analysis and assaying the production of a chemically pure meta for many important operations, is obtained by electrolysis.

The impurities in commercial copper are very numerous; arsenic and silver form the invariable ones, as also bismuth, which latter appear to be always present. The greater the purity of the copper the greater its malleability or softness, and the less heat is required to deprive it of its brittleness, produced by heating. Copper contaminated with other metals exhibits not an indented but a scaly, granular fracture, and has a feeble lustre.

While the specific gravity of copper varies 8.91 to 8.95, that of the native crystallized copper is 8.94, and that of electrotype copper is 8.914, that of pure copper after fusion 8.921, of copper plate formed by rolling and afterwards hammered 8.952.

The specific heat of copper is=0.09515, between 0° and 60° C. Copper melts more easily than gold, less easily than silver, and its melting point is between 1,000° and 1,200° C. It expands on solidifying; it is an excellent conductor of heat and electricity, standing next to silver in this respect. Its power of conducting electricity is a feature of great importance, and in the construction of the finer electrical apparatus perfect purity is of the utmost consequence. The affinity of copper for oxygen is much weaker than that of iron for the same element. It decomposes water only at a bright red heat; in dry air it remains unaltered at ordinary temperatures, but it oxidizes rapidly at a red heat, while in damp air it acquires a green coating of basic carbonate, and its oxidation is remarkably promoted by the

presence of acids. Copper does not dissolve in cold hydrochloric acid, but when boiled with that acid it displaces hydrogen, and dissolves slowly. Nitric acid of ordinary strength acts violently on copper, with copious evolution of nitric oxide and formation of cupric nitrate. But the strongest nitric acid, of specific gravity 1.52, does not act on copper, the metal, when immersed in it, remaining bright and quiescent. The same passive state is exhibited by other metals when immersed in strong nitric acid, especially by iron. On diluting the acid with water a violent action is instantly set up. Nitro-muriatic acid dissolves copper with facility. Copper is not attacked by dilute sulphuric acid or even by strong sulphuric acid at common temperatures; but on applying heat, sulphurous acid is evolved, and sulphate of copper is produced. Copper likewise oxydizes in alkaline and in saline solutions exposed to the air; in a dilute solution of ammonia exposed to the air it is converted into cuprous oxide, and dissolves.

Copper when in foil or filings, takes fire in chlorine gas at ordinary temperatures; at a red heat it unites directly with bromine, iodine, sulphur, selenium, silicium, and all the metals; with mercury at ordinary temperatures. With carbon and with nitrogen it does not appear to unite directly even at red heat.

The assay of copper ores is effected both in the dry and the wet way, and also by the volumetric method, but the simplest method is in an approximative one, and consists in dissolving a given quantity in nitric acid, mixing the solution with excess of ammonia and comparing the color with that of a series of standard solutions prepared in a similar manner.

MARKET REVIEW.

Friday Evening, March 19, 1869.

Gold and Silver Stocks.—Combination Silver has again receded, notwithstanding some holders continue firm at advanced rates. The quotation to-day was $1 75. Manhattan, for which $35 00 was offered last week, has steadily declined for the past few days, and to-day it was offered at $24 00. Owyhee Silver is now quoted at $22 00. Sales are made at $20 00. In Gold Stocks we notice that Consolidated Gregory went back to $2 35, and Smith and Parmelee to $1 30. Sales of the latter are reported at $1 25@1 35. The following is the circular of the New York Petroleum and Mining Stock Board:

	Bid.	Asked.
Alameda Silver	..	..
American Flag	..	..
Bates & Baxter Gold	..	..
Benton Gold	15	
Bobtail Gold	..	..
Black Hawk Gold	..	..
Consolidated Gregory	2 35	2 50
Edgehill Mining		
Gold Hill	..	..
Gunnell Gold	..	..
Grass Valley	1 25	1 40
Hamilton G. & S. B.	..	..
Holman	..	
Hope Gold	..	..
Twin River Silver		
Gunnell Union	..	..
Combination Silver	1 75	4 00
Sensenderfer		....
Quicksilver	21	21⅛
Atlantic and Pacific		
Kipp & Buell Gold	..	
La Crosse Gold	..	..
Liberty Gold	1	
Manhattan Silver	24 00	75 00
Midas Silver		
Montana Gold	35	38
New York		
Nye Gold	..	
Owyhee Mining		22 00
People's G. & S. of Cal	..	
Quartz Hill	90	90
Rocky Mountain Gold		..
Smith & Parmice Gold	1 30	1 40
Texas Gold	..	
Corydon	..	..
Symonds Fork Gold		
N. Y. & Eldorado	41	51
Mariposa	17⅛	18
Mariposa preferred	34⅛	34⅞
Eagle Gold		

Copper Stocks.—Davidson is held at 50 cts., with offers of 30 cts. Rockland is held at $3 00. At Boston, to-day, prices have ruled as follows.

Copper Falls	14	Quincy	29¼
Franklin	19¼	Cary Improvement	8¼
Hancock	5	Hecla	..
Minnesota	2¼	Bos. Hart. & Erie R. R.	25
Calumet	50	Isle Royal	..
Water Power	17		

Petroleum Stocks—The prices of Petroleum stocks are thus quoted at the Board.

	Bid.	Asked.		Bid.	Asked.
Bennehoff Run	.. 85		Rynd Farm	10	
Brevoort	....	2 00	United Pet. Farms	.. 15	20
Buchanan Farm	55	60	Union	....	....
Central	65	74	United States	1 00	1 20
Clinton Oil	....	....	Sherman & Barnsdale	..	..
National	2 50	3 25	Second National	..	..
N. Y. and Alleghany	.. 50	1 00	Bliven	..	..
Pithole Creek	1 30	1 40	Rathbone	..	..
Home Petroleum	2 35	5 00	Northern Light	.. 35	..
Pacific Oil	..	....	Bergen Coal and Oil	.	..

Miscellaneous Stocks.—American M. Ex. is quoted at 41; Pacific Mail S. S., 91; Boston W. Power, 17; Quicksilver M., 19⅛; Western Union Telegraph, 37⅛; N. Y. Cen. Railroad, 159½; Reading, 91; Mich. Cen., 118; M. S. & N. I., 96½; Chi. & Northwestern, 84@84¼; Clev. C. & In. Railroad, 64@65; M. & St. P., 69@69½; D. L. & W. Railroad, 114¼; Tol. W. & W., s. 60, 66½@67; New Jersey C. Railroad, 110½; Morris & Essex, 87½; Col. Cin. & I. C., bet. call, 43; H. & St. Jos. Pf., 118½@117½; Wallkill, 22; Wallkill, assented, 50; Brunswick City Land, $9@$10; Rutland Marble, $17 75@$20.

State, R. R. and Other Bonds.—West. Un. Tel. 7's bds. are quoted at 87; Mar. Trustee 10's Ctfs., 68¼; Metropolitan Bank, 142; Bk. of Commonwealth, 114; Imp. & Traders, 130; Continental Bk., 100; Am. Ex. Bk., 118; Fourth Nat. Bk., 103; Tenn St 6's, ex. epn., 66; Tenn. St. 6's, new, 65; Mich. 6's, '78, 98; Missouri 6's' 87½@88; Georgia 6's, '82; N. Y. S. 6's, '77, 103; Mich. S. S. F. Bds., 98; Chi. Bur. & Q. S's, 111; Chi. & N. W. 1st m., 90; Tol. & Wab. 1st ext'd., 91, Mich. C. S's, new bds., 117½; C. & R. I. & P. P. R. T's, 94; M. & E. 1st, 99½@99¾; Mor. & Es. 2d, 90; New J. Cent. 1st m. 99; P. Ft. W. & C. 1st m, 101¼; G. Western 2d, 79; Col. C. & Ind. Central 1st, 86½.

Government Bonds.—Governments are active, and in sympathy with gold. We have to report the following quotations at the first and second calls to-day:

U. S. 6s, 1881, coupon	116¼@116¾	U S 5-20s, '65, new coup.	113⅛ 113½
U. S. 5-20s, 1862, coupon.	119¼ 119¾	U. S. 5-20s, 1867, coupon.	113⅛ 113¾
U. S. 5-20s, 1864, coupon.	114⅛ 115	U. S. 5-20s, 1868, coupon.	113⅛ 113⅝
U. S. 5-20s, 1865, coupon.	116¼ 117⅛	U. S. 10-40s, ex. coupon...	105¼ 105¾
Pacific R. R. 6 per ct. bds.	103¼ 103½		

Foreign Exchange—Is quiet and heavy. Transfers have been made at 109@109¼. We quote.

Lon. (pr. bks), 60 dys	108¼@ 108⅝	Swiss	5.21½ 5.20
Lon. (pr. bks'), sght	109 109¼	Hamburg	35¼ 37½
London, prime com	108 108½	Amsterdam (bankers')	40⅛ 40⅜
Paris (bankers'), long	5.20 5.18¾	Frankfort (bankers')	40⅜ 40⅝
Paris (bankers'), short	5.17½ 5.16¼	Bremen (bankers')	78½ 78¾
Antwerp	5 17½ 5.16¼	Berlin (bankers')	71½ 71¾

Gold.—Gold has fluctuated between 130¾ and 131⅛. Loans have ranged from 2 per cent. "for carrying to 3-32 per cent. for "borrowing."

Money shows a good deal of activity. This morning there has been a good deal of changing of loans. Needy borrowers have, in some instances, had to pay coin interest, but the general rate has been 7 per cent. on both stocks or Governments.

The discount market shows a good deal of firmness, owing to the limited demand for paper. Prime names range from 9 to 12 per cent.

The following are the quotations.

American silver	95 @ 95¼
Mexican dollars	103¼@104
English silver	480 @485
Five francs	95¼@ 96¼
English sovereigns	486 @489
Twenty francs	384 @386
Thalers	70½@ 71

Petroleum.—For crude, in bulk, the demand is light and prices are unchanged. We quote at 16¼@17c. For Refined standard white there is more disposition to realize. Prices are lower. Sales are 4,000 bbls., on the spot, at 30c., and 1,000 for balance of the month at 30c. For Philadelphia delivery, sales are 1,000 bbls. standard white, for March delivery, at 30c.; 4,000 bbls. from April to May, at 32c., and 500 for June, at 33½c.

Receipts for the week ending March 16	pkgs	11,466
Exports for the week ending March 16	galls.	1,018,137
Exports from Jan. 1	galls.	8,761,177
Exports same time last year	galls.	3,707,801

The following is the quantity exported from other ports, Jan. 1 to March 13.

	1869.	1868.
From Boston galls.	565,900	484,417
Philadelphia	3,458,032	3,568,985
Baltimore	73,654	205,155
Portland	....	6,500
Cleveland	....	....
Total	4,097,586	4,339,228
Total exports from the United States	12,746,161	13,364,459
Same time in 1867		7,982,092
Same time in 1866		10,297,344

We notice the following vessels loading here for Europe:

Bark Konigin Augusta	3,500	bbls. Ref.
N. E. bark Stella	3,500	do.
Ship Julia	6,000	do.
Italian bark Semeto, Cork, for orders	2,900	do.
Bark Russia	2,400	do.
Brig Monarco Del Mara	1,400	do.
Brig Mathilde	1,250	do.
Bark Mauri	4,200	do.
Brig Amelia Phillipsen	1,000	cases.

The following vessels are loading at Philadelphia:

Br. bark Northern Light, Antwerp	5,400 bbls.
Ship Northern Queen	5,000 do.
Brig Cairo	2,200 do.
Bark Annie	3,000 do.
Brig Margory	1,500 do.

Copper has been unsettled. Large transactions, estimated at 600,000 pounds of Baltimore and Lake Superior have been forced at 25½@26c. The latter is the quotation of to-day.

The English market has advanced from £71 to £72 10 for Chili Bars.

Tin.—In consequence of the advance in London to 130s. for Straits a speculative demand has sprung up here, and 4,000 slabs, straits, have been sold at 32@32½c. This is quoted to-day at 33, and with but little offering. Banca 34., and English 31½c. These prices are far below the European quotations.

Spelter is dull at 6½c., gold, with a jobbing business in Silesian. American 11c., currency.

Lead.—The stock is small but the business is light. Sales 150 tons ordinary foreign $6 30@$6 35, gold.

Zinc.—Sheet 13c.; Fine white French 11½c.; American 8c.

Lime.—The market for Rockland is firm at $1 25 for Common, and $2 for Lump.

Regulus Antimony.—We note sales of 5 casks at 12½c., gold.

THE IRON TRADE.

New York, March 19, 1869.

There is no change of moment in the American Iron Market to note; sales of 300 tons of Allentown iron have been made in lots at $42; the market remains quiet, with but little inquiry. There seems to be little disposition to operate at present prices, and lower prices are looked for.

Scotch Iron—Stock still continues light, and large sales have been made for future shipment at $32, gold, for Coltness and Gartsherrie; Glengarnock, $31; Cambroe, $30½; Egliston, $30½, all gold prices; 700 tons Gartsherrie, arrived by steamer, was sold at once at $42@$42 50, currency.

Scrap Iron—Sales have been made of 1,500 tons for delivery at Eastern ports at private terms. We note 1,700 tons sold on private terms.

Old Rails are higher, being generally held at $35 50, gold. No sales of moment.

Bar from store remains dull at our quotations—American makers' price $87 50 in Philadelphia—the invoice of Foreign offering to arrive, have not been placed. No. 9 Russia Sheet is very scarce.

Lehigh Valley Iron Trade.

Pig Iron transported by the Lehigh Valley Railroad Co. for the week ending March 13, 1869:

From	Tons.	Total.
Carbon Iron do	175	9,825
Lehigh Valley Iron Co	320	12,150
Thomas Iron do	1170	40,085
Lehigh Crane Iron do	1020	35,680
Allentown Iron do	480	37,000
Robert Iron do	200	11,235
Glendon Iron do	1065	29,429
Other Shippers	790	24,845
Total	5,220	201,009

Market Prices.

New York, March 19, 1869.

Duty.—Bars, 1 to 1½c. per lb.; railroad, 60c. per 100 lbs.; boiler and plate; 1½c. per lb.; sheet, band, hoop and scroll, 1½ to 1¾c. per lb.; pig, $9 per ton, polished sheet, 3c. per lb. Payable in gold.

Am. pig, fy. No 1, best,	$40 00@42 00		
" " 2x frdy,	38 00 40 0		
" Grey Forge	36 00 38 00		
White and Mottled	32 00 35 00		
Pure white for Cal. mar.	32 50 — —		
Scotch Pig, No. 1, best bd	40 00 42 00		
" " " outside,	40 00 — —		
Wt. No. 1Scrap f'm yd.	.... 50 00		
Ex ship	45 00		
Bar, Ref., En. & Am.	90 00 95 00		
Bar, Sw's, as. sizes, gold	82 50 87 50		
Old Rails	47 00		
R.R. Iron, For., fm Stock			
gold	54 50 55 50		
R. R. Iron For., to imp.	55 00 00 00		
" " Amer. at wks.			
currency	75 00 76 —		
R. R. Iron, Am., deliv'd	78 00 80 00		
Stl rails of any pattern at			
works, currency			
Solid Steel rls. For., gd.	95 — — —		
Street Rails at works	85 00 — —		
Light rls. for mines &c.			
at works	$85 00@— —		
Do. delivered here	.... — —		

STORE PRICES.

Bar, Swedes, ord'y sizes	— —	145 00	
Bar, Eng. and Am., rf'd.	90 00		
Bar, Eng. & Am., com.	85 00	87 50	
Scroll	125 00	160 00	
Ovals and half round	122 50	150 00	
Band	125 00	— —	
Horse Shoe	122 50	— —	
Rods, ¼@3-16 inch	100 00	160 00	
Hoop	135 00	185 00	
Nail Rod, per lb	8¼	10	
Sheet, Rus., as'd. Nos. (gold)	11¼	13	
Sheet, s'gle. D & T. com	5¼	7	
Rails, Eng., gold, ton.	55 00	56 00	
Rails, American	74 00	76 00	
STEEL.			
English, cast 2d & 1st qual.	18 @22		
Eng. Spring 2d & 1st qual	9	11¼	
Eng. Blister 2d & 1st qual.	11¼	19	
English Machinery	12½	15	
Eng German 2d & 3d qual.	14	16	
Am. Blister, "Black Diam'd,"	10¼	16	
American, Cast, Tool "	19	—	
American, Spring "	10	13	
American Machinery "	—	13	
American German "	10	13	

THE COAL TRADE.

New York, March 19, 1869.

Wholesale—There has been an active trade for all sizes and kinds of coal during the past week, and most dealers quite "sold out." Prices have not, however, changed. The demand comes from all quarters, and the East is not excepted. There is no coal of the larger sizes to be had at any price. Retailers have evidently suddenly come to realize that coal is "as low as it will be," and, fearing lest a strike should entirely debar them from a supply, are endeavoring to lay in stock. The large supply of coal in this market and the East that we noted in February, seems to have melted away, as it were, and now we learn that the market is almost entirely bare, and that the stock at the East is very low. The late cold weather has had a tendency to increase the demand, and as our rivers and canals are still closed, we are without relief from these avenues of transportation. Notwithstanding an active business, there appears no change in the prices, which dealers, nevertheless, claim do not pay at the present rates of transportation. "That committee" to which we have referred in previous numbers, as organized by a representative from the leading companies, and whose object was to make some arrangement whereby the market was to be regularly supplied with a given amount of coal, of which each company should transport its proportion, thus keeping a steady and profitable market, has not produced, up to this hour of writing, any practical plan. Mr. Parish, President of the Wilkesbarre Coal and Iron Co., who is the projector of the enterprise, is working hard, and we think will succeed. We wait to see whether anything *good* can possibly be brought out of the coal trade, and whether business can be conducted in this line of trade on the same sound principles as in others.

The drawbacks on the Philadelphia and Reading Railroad will probably be made up by the same parties that compose the committee, and we shall be able to lay a full report before our readers next week. The trade generally is much excited in relation to the ultimate action of the committee.

Freights rule lower. Vessels are in good supply.

Retail.—The retail trade in this city has been good during the past week Prices are a shade firmer.

The following will show the exports of coal from the port of New York for the week ending March 16, and for the season to that date, also the amount exported last year for the some period;

Exports for the week	tons	933
Do. from January 1	do	14,385
Do. same time last year		10,394

Philadelphia, March 18, 1869.

The market is quite dull, very little coal selling. Everybody appears to be waiting for the arrangement of drawbacks by the Reading Railroad. This will probably be done next Monday.

The following table exhibits the amount of Coal that was passed over the various routes of transportation from the Pennsylvania Coal districts for the week ending March 13, 1869, and for the season to that date. A comparison is also made with the amount transported the corresponding week in 1868, showing the increase or decrease, as the case may be:

	1868.		1869.		INC. OR DEC.	
COMPANIES.	WEEK.	TOTAL.	WEEK.	TOTAL.	WEEK.	YEAR.
Phil. & Read. R. R.	57,046	550,702	59,348	553,701	i 2,302	i 2,999
*Schuylkill Canal	....	....	938	....	....	
Lehigh Valley R. R	49,142	512,061	48,399	574,081	d 1,763	i 62,020
Lehigh & Sus. R. R	8,306	52,104	18,968	173,291	i 5,662	i 121,187
*Lehigh Canal	....	....	....	....	....	
Scranton North	6,961	76,596	10,328	99,014	i 3,367	i 22,418
Scranton South	23,958	199,451	27,948	297,010	i 3,995	i 97,559
Penn. Coal Co. rail.	14,192	99,115	13,702	149,575	d 490	i 50,460
*Penn. Coal Co. can.	....	....	....	....	....	
*Del. & Hud'n Can.	....	....	....	....	....	
Shamokin	8,314	66,141	5,908	65,256	d 2,410	d 884
Trevorton	566	3,626	567	3,558	i 001	d 068
Short Mountain	1,209	7,100	1,443	7,201	i 234	i 101
Lykens Valley Co.	1,985	16,580	1,008	7,701	d 976	d 9,178
Hunt'g'n & B'd T'p	4,373	27,431	4,894	36,935	i 521	i 29,504
*Wyoming South	....	....	....	....	....	
*Wyoming North	....	....	....	....	....	
Williamstown Col.	2,249	22,586	4,300	25,609	i 2,050	i 3,022
Total	178,287	1,633,493	192,726	2,012,682		
1868			178,287	1,633,493		
			i 14,439	i 379,189		

*Closed.

Lehigh and Susquehanna Railroad.

Report of Coal shipped for week ending March 13, 1869.

WHERE FROM	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt
WYOMING REGION.		
Newport Coal Co	....	
Albrig'ton, Roberts & Co	74 14	335 18
New England Coal Co		21 07
Morgan Mines	....	
Warrior Run Mining Co	....	
Parrish & Thomas		3,579 01
New Jersey Coal Co	319 14	2,377 16
Gaylord Mines	....	
Delaware & Hudson Canal Co	1,385 17	12,125 13
Lehigh & Susquehanna Coal Co	....	
Germania Coal Co	502 06	4,255 14
Franklin Coal Co	....	
Audenreid Improvement Coal Co	....	
Wilkesbarre Coal & Iron Co	3,954 11	44,937 01
Union Coal Co	....	
Mineral Spring Coal Co	53 09	3,272 18
H. B. Hilliman & Son	184 07	1,477 11
Bowkley, Price & Co		682 19
Wyoming Coal & Transportation Co		1,108 08
Henry Colliery	471 05	2,742 19
J. H. Swoyer		
Everhart Coal Co	248 06	5,923 16
Morris & Essex Mutual Coal Co	....	
Shawnee		1366 13
Pine Ridge Colliery		3,256 09
Lances Colliery		200 07
Consumers Coal Co		
Harvey Brothers	....	
Lehigh & Luz. Coal Co	831 06	9,258 06
Other Shippers		
Total Wyoming Region	8,000 00	97,031 15
UPPER LEHIGH REGION.		
Upper Lehigh	2,670 11	31,645 05
Other Shippers		
Total Upper Lehigh Region	2,670 11	31,645 05
HAZLETON REGION.		
A. Pardee & Co	23 00	256 16
Linderman & Skeer		25 05
Sharpe, Weiss & Co		205 17
Wm. Taggart	37 07	243 04
Harleigh Coal Co		111 12
G. B. Markle & Co	11 05	182 11
Ebervale Coal Co		99 13
Stout Coal Co		
Buck Mountain Coal Co		83 03
Coxe Brothers & Co		55 02
Ashburton Coal Co	....	
Highland Coal Co		
Pardee Brothers & Co		26 02
Jeddo Coal Co	24 14	118 17
Mount Hall (s. s. s.)	....	
R. R. Carter	....	16 18
Other Shippers	....	73 14
Total Hazleton Region	95 06	1,341 07
MAUCH CHUNK REGION.		
Lehigh Coal & Navigation Co	....	
Summit Mines	3,200 17	43,272 14
Room Run Mines		5,994 17
Other Shippers	....	
Total Mauch Chunk	3,200 17	43,272 11
" Mauch Chunk Region	3,200 17	43,272 11
" Hazleton	96 06	1,341 07
" Upper Lehigh	2,670 11	31,645 05
" Wyoming	8,000 00	97,031 15
Grand Total	13,968 03	173,290 18
Corresponding week last year	8,806 01	52,103 19
Increase	5,662 02	121,186 19
Decrease	....	....
Forwarded South from Mauch Chunk by Rail	12,154 17	156,005 10
Delivered on line of L. & S. R. R. ab've M'ch C'k	698 10	6,985 14
Delivered to Lackawanna & Bloomington Railroad at Plymouth Bridge	700 10	5,468 11
Delivered to L. V. R. R. Co, at Sugar Notch	16 05	4,841 03
Delivered at Coal Port for shipment by canal	....	....
Total	13,968 03	173,290 18

Report of Coal Transported over Lehigh Valley Railroad

For the week ending March 13th, 1869, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy	5,298 06	41,994 15	47,288 01
Total B. Meadow	8,711 06	72,076 07	80,787 13
Total M. Chunk		32 03	32 03
Total U. Lehigh	247 17	5,164 04	5,413 01
Total Hazleton	28,187 03	278,316 01	306,503 04
Total Wyoming	5,938 13	116,949 04	122,887 17
Total	48,379 05	514,532 14	563,911 19
To L. & S. R., at Penn Haven for r'l		4,174 00	4,174 00
Do. for Canal		4,184 06	4,184 06
At Mauch Chunk for canal		2,259 07	2,259 07
Total Anthracite	48,379 05	525,150 07	573,529 11
Susquehanna region Bit. Coal, F. C'k		552 03	552 03
Total by rail and canal	48,379 05	525,702 10	574,081 15
Same time last year	49,142 09	462,919 07	512,061 16
Increase		62,783 03	62,019 12
Decrease	763 04		....
Forwarded east from M. Chunk by r'l	46,948 11	496,530 16	543,479 07
Same time last year	48,997 04	454,780 15	503,777 19
Increase		41,750 01	39,701 08
Decrease	2,048 13	....	....
RECAPITULATION.			
Forwarded east from M. Chunk by r'l	46,948 11	496,530 16	543,479 07
Delivered at Mauch Chunk	37 14	399 05	436 19
Del. on line of r'd above M. C'k	259 09	3,032 00	3,291 08
Del. ab. M. C. for use of L. V. rail'd.	892 09	13,692 02	14,584 11
To L. & S. r'd at Penn Haven for rail		4,174 00	4,174 00
Do. for shipm't by canal		4,184 06	4,184 06
At Packerton	241 02	1,430 14	1,671 1
At M. Chunk for shipment by canal		2,259 07	2,259 07
Total	48,379 05	525,702 10	574,081 15

Schuylkill Coal Trade.

BY RAILROAD AND CANAL, FOR WEEK ENDING, MARCH 18.

	RAILROAD.	CANAL
St. Clair	81,115	....
Port Carbon	7,339	....
Pottsville	2,291	....
Schuylkill Haven	11,654	....
Auburn	565	....
Port Clinton	8,908	....
Company's use	1,673	....
Total for week	63,545	6,851.05
Previously this year	553,701	938.10
Total	617,246	7,789.15
Same time last year	606,806	
Increase	10,440	

At Philadelphia, March 18, 1869.

Lehigh L'p and St'mb't..	7 00	" Egg and Stove.	
" Broken and Egg..	6 50	" Chestnut.....	
" Stove.....	7 00	Locust Mount Lump....	4 75
" Chestnut.....	6 25	" Steamboat.	4 75
Schuylkill R. A.....		" Broken ...	4 75
" Chestnut.....		" Egg.....	4 75
" W. A. Lump ..		" Stove.....	5 00
" Broken			

SPECIAL COALS.

Lorberry Coal.....	5 00	5 50	Burnside R. A.Egg.& St.	4 75	5 00
Shamokin.....	4 75		Powelton Coal Co.....	5 00	
Franklin, (Lykens Val.).		5 25	Hill & Harris, Egg & St.		4 50
Broad Top		5 00	Henry Clay, Egg & St...	4 50	4 75

Dealers in these coals may be found in our advertising columns.

Powelton Coal at Philadelphia, March, 1869.

Powelton Egg and Stove.....	$5 00	Powelton Gas.....	$7 80
Powelton Semi Bituminous...	5 00		

Scranton Coal at Elizabethport, March, 1869.

(Corrected weekly by D. L. & W. R. R. Co.

Lump.....	4 75	....	Egg.....	4 75	....
Steamer.....	4 75	....	Stove.....	5 00	....
Grate.....	4 75	....	Chestnut.....	4 25	....

Prices for Pittston Coal at Newburgh, March, 1869.

(Corrected weekly by Penna. Coal Co.)

Lump, per ton, 2240 lbs..	4 50	....	Egg " "	....	4 60
Steamer, " "	4 50	....	Stove " "	....	4 90
Grate " "	4 50	....	Chestnut " "	....	4 40

70c. Freight to New York.

Lackawanna at Rondout, March, 1869.

Lump.....	4 60	....	Egg.....	4 70	....
Steamer.....	4 60	....	Stove.....	4 90	....
Grate.....	4 60	....	Chestnut.....	4 00	....

65 cents Freight to New York.

Lehigh Coal at Mauch Chunk.

March, 1869.

Lehigh L'p and Steamboat....	$3 50	Stove.....	$3 75
Broken and Egg.....	3 50	Chestnut.....	3 25

$2 35 Freight to Philadelphia.

Lehigh Coal at Elizabethport, March, 1869.

Lump.....	6 00	....	Stove.....	3 75	....
Steamboat and Broken..	5 00	....	Chestnut.....	3 25	....
Egg.....	5 00	....			

50c. Freight to New York.

Wilkesbarre Coal at Hoboken, March, 1869.

(Corrected by Wilkesbarre Coal & Iron Co.)

Lump.....	4 75	....	Egg.....	4 75	....
Steamer.....	4 75	....	Stove.....	5 00	....
Broken.....	4 75	....	Chestnut.....	4 50	....

45 cents Freight to New York.

At Baltimore, March, 1869.

Wholesale prices to trade.		Trevorton R. A.....	$6 25	6 50
Wilkesbarre by cargo or car load.....	$6 60	@6 80	By retail, per ton of 2,240 lbs., delivered.....	8 75	9 25
Pittston and Plymouth..	6 25	6 75	Georges C'k & Cumberland f. o. b. at Locust Point for shipping.....	....	5 00
Shamokin R., or W. Ash	6 25	6 50			
Lykens Valley, R. A.....	....	6 85			

At Havre de Grace, Md.

Cargo prices for shipment *south* of Patapsco River, (drawback allowed of 10 per centum.)			Shamokin R. or W. Ash.	$....	@....
			Lykens Valley R. A.....	....	....
			Trevorton R. A.....	....	....
Wilkesbarre and Pittston W. Ash.....	$....	@....			

At Georgetown, D. C. and Alexandria, Va.

George's Creek and Cumberland f. o. b..... .... @4 75

Prices of Gas Coals.

March, 1869.

PROVINCIAL. Duty, $1 25	Coarse. Gold.	Slack. Gold.	AMERICAN.	Coarse. Currency.	Slack. Currency.
Block House.....	$1 75	@$4 75	Westmoreland Co ...	$8 50	$8 00
Gowrie.....	1 75	75	Despard Coal Co.....	8 50	8 00
Lingan.....	1 75	75	Penn.....	8 50	8 00
Sydney.....	2 18¾	71¼	Newburgh Orrel Gas..	8 50	8 00
Pictou.....	2 13¾	1 18¾	West Fairmont Gas Coal.....		7 00
Little Glace Bay.....	1 75	1 00	Powelton Gas Coal. ..	8 00	7 00
Caledonia.....	1 60	75			

Prices of Foreign Coals.

March.

Duty, $1 25 per ton.

Corrected weekly by PARMELEE BROS., 32 Pine Street, N. Y.

Liverpool Gas Caking.....	$ 9 50	Liverpool House Cannel	18 00	19 00
" " Cannel.....	14 00	" " Orrel.	16 00	18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverp'l House Orrel, scr'd..	$16@18	Liverp'l House Can'l,scr'd	$18 00	20 00

Per ton 2000 lb., delivered.

Coal Freights.

(Corrected Weekly).

Freights on Coal Sea-borne from Port Richmond, Philadelphia.

March 18, 1869.—From Philadelphia and Reading R. R. Wharves, Phila., to

Bangor.....		....	New London.....	—	1 80
Boston.....	2 00	2 50	Dover.....	—	2 50
Providence.....		2 00	Cohasset Narrows.....	—	2 50
Lynn.....and discharging		2 50	Cambridgeport.....	—	2 75
Portland.....	2 00	2 50	Dorchester.....	—	2 50
Fall River.....	2 00		Fair Haven.....	—	2 00
New Bedford.....		2 00	Gloucester.....		2 75
Salem.....		2 50	Lawrence.....	—	3 00
Newport.....	—	2 00	Old Cambridge.....	—	2 53
East Cambridge.....	—	2 50	Saco.....	—	2 75
Newburyport.....	—	2 50	Roxbury.....	—	2 75
Portsmouth.....	—	2 50	Salisbury.....	—	2 75
Charleston.....	1 75	2 00	Greenport.....	—	2 00
Danversport....and discharging		2 50	Norwich.....	—	2 00
Amesbury.....	—	2 75	Harlem.....	—	1 45
Beverly.....		2 50	New Rochelle.....	1 30	1 40
Charlestown.....		2 50	Sag Harbor.....	—	1 50
Hingham.....		2 50	Spuyten Duyvel.....	—	1 35
Marblehead.....		2 50	Williamsburg.....	—	1 35
Nantucket.....	—	2 50	Jersey City.....	—	1 35
Plymouth.....	—	2 50	New Brunswick.....	—	1 20
Provincetown.....	—	2 25	Alexandria.....	—	1 25
Washington.....	—	1 40	Fredericksburg.....	—	2 00
Calais.....	—	2 75	Wilmington, Del.....	—	75
Machiasport.....	—	2 75	Bath.....		2 50
Hoboken.....		1 35	East Greenwich.....		2 00
Hyannis.....		2 25	Albany.....		1 95
Malden.....		27 5	New York.....		1 35
Nahant.....and discharge		2 50	Troy.....		1 95
Weymouth.....and towing		2 50			

Provincial Freights.

TO NEW YORK.	$	TO BOSTON.	$
Sydney.....		Sydney.....	
Lingan.....		Lingan.....	
Cow Bay.....		Cow Bay.....	
Port Calidonia.....		Port Calidonia.....	
Little Glace Bay.....		Little Glace Bay.....	

From Elizabethport and Port Johnson.

Albany.....	$....@—	—	New London.....	$1 25	— —
Boston.....	1 75	2 25	Newport.....	1 40	— —
Bridgeport.....	1 15	— —	New York.....	50	— —
Fall River.....	1 40	— —	Norwalk.....	1 15	— —
Hartford.....		— —	Norwich.....	1 50	— —
Hudson.....		— —	Pawtucket and towing..		— —
Wareham.....		— —	Portland.....	1 75	
Middletown.....		— —	Portsmouth.....	2 00	
New Bedford.....	1 55	— —	Providence.....	1 40	— —
Newburyport.....	2 00	— —	Salem.....	1 75	— —
New Haven.....	1 15	— —	Augusta.....	3 00	— —
			New Orleans.....	2 70	2 80

Foreign Freights.

New Castle and Ports on Tyne.....	£13@£15 keel.				
Liverpool.....	12s. 6d.@15s. ton.				
Australian.....	9 50	@10 00	Lehigh.....	15 50	@16 00
do. Wallsend.....	10 00	10 50	Liverpool.....	13 00	....
Bellingham Bay.....	11 00	....	Pittston, ton.....	14 50	15 00
California.....	7 00	9 00	Scranton.....	14 00	15 00
Cumberland cks.....	30 00	32 00	Scotch.....	13 00	....
do bulk.....	28 00	...	Vancouver Island.....	12 50	....
Chili.....	10 00	....			

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

At New York, March 10, 1869.

Schuylkill R. A., choice..	$....	....	Schuylkill Chestnut...	$....	....
" Ordinary.....	....	....	Lehigh W. A. L'p old Co..	....	6 05
" W. A. Lump .	....	....	" Broken.....	....	5 25
" Steamboat....	....	....	" Egg	....	5 25
" Broken.....	....	....	" Stove.....	....	5 25
" Egg	....	....	" Chestnut.....	....	4 70
" Stove.....	....	....	Shamokin.....	....	4 75

SPECIAL COALS.—DEALERS' QUOTATIONS.

Diam'd Vein R.A.,Sch'kill	....	....	Old Co.'s W. A. Lehigh..	6 00	5 25
Locust Dale W. A., "	....	....	Mt. Pleasant.....	6 00	5 25
Honey Brook " Lehigh	5 25	6 00	Buck Mountain.....		
Harleigh " "	5 25	6 00	Fulton.....	5 50	6 50
Spring M'n " "	5 25	6 00	Stout.....	5 50	6 50
Sugar Creek " "	5 25	6 00	New England Red Ash..		....
Sugar Loaf " "	5 25	6 00	Wyoming.....	6 00	....

Dealers in these Coals may be found in our advertising columns.

Rates of Transportation to Tide Water.

[BY RAILROAD.]

To Port Richmond, Philadelphia.

Philadelphia and Reading Railroad, from Schuylkill Haven.....$2 00

The following are the drawbacks allowed on all coal shipped East of New Brunswick and South of Cape Henry, until further notice.

	Drawback.	Freight.	Nett
Lump.....	..	$2 ..	$....
Steamboat.....	..	2 ..	....
Broken.....	..	2 ..	....
Egg.....	..	2 ..	....
Stove.....	..	2 ..	....
Chestnut.....	..	2 ..	....

From Port Carbon, 8 cents per ton more.

To Elizabethport.

L. V. Railroad from Mauch Chunk to Easton.....	$ 1 04
C. R. R., N. J., Easton to Elizabethport.....	1 55
	2 59
Shipping Expenses at Elizabethport.....	25
Total.....	2 84

To Port Johnson.

L. V. R R.....	$ 1 04
C. R. R. of N. J.....	1 63
Shipping Expenses.....	25
Total.....	2 92

To Hoboken.

L. V. R.R.....	1 04
Morris & Essex R.R.....	1 63
Shipping Expenses.....	25
Total.....	$2 92

Coal and Iron Freights Coastwise.

We take from the N. Y. Shipping List the following account of freight movements in Philadelphia:—"It is understood that the Vessel Owners' Association of Philadelphia, are making strenuous efforts to put up coal freights, and to this end are using their influence to control all the coasters arriving there. Shippers and miners have, therefore, advised their New England correspondents not to send orders for coal under the limit of $2 50 freight, as they cannot fill them at a lower rate. Boston and ports beyond will be the principal sufferers if the combination succeeds, but the chances are against its success—for any considerable length of time, at least. The trouble in Cuba will be very apt to throw an increased supply of small tonnage on the market, and thus disturb the calculations of the Philadelphia combination. Besides, the necessity of a more complete and economical system for the transportation of coal and iron than sailing vessels afford, has induced the formation of a corporation, under the general laws of the State, entitled the Pennsylvania, New York and New England Steam Navigation Company, for the building of a line of iron propellers to ply between the various coal and iron ports, and the consuming districts of New England. The benefits to be derived from the enterprise are, that the producers of coal, by the regular transportation to be afforded by steam, can regulate their production and shipments to suit the market; the railroads bringing coal and iron from the mines can run their trains to agree with the movements of the steamers in their arrival and departure, whereas there is no certainty under the present system of sailing vessels, and expensive delays are frequent; and that the manufacturer can contract for his coal and iron at the most favorable seasons, with an assurance that no loss will accrue from lack of transportation. The steamers, it is claimed, like the English steam colliers, can be built and run cheaply, and carry larger freights, with less draft of water, than sailing vessels. It is stated that a fleet of thirty iron steamers, of five hundred to one thousand tons capacity each with iron barges as auxiliaries, will be immediately put on the line, and it is confidently expected that a cheap and uniform system of paying freights can be maintained, remunerative and profitable to all concerned. The advantages of having the freightage of coal and iron performed by steam vessels, as proposed by this company, are manifest to every business man. Steamers have superseded sailing vessels in this traffic in England, and there seems to be no reason why they should not here. The business is rapidly increasing, and as in other branches of trade, steam is found a better servitor than wind, so it must be eventually, if not now, in this.

London Weekly Metal Report.

LONDON, E. C., 19th February, 1869.

The metal market has been quiet during the past week, prices however fairly maintained.

IRON.—Welsh bars keep dull, but rails are stronger and prices looking up. A fair business doing in Staffordshire iron. Scotch pig iron has drooped to 54s. 10½d. cash.

COPPER is very flat, and buyers very shy. Advices from Chili to 17th Jan. by telegram via New York, give the charters for first 14 days January at 2,900 tons, which depressed the market still further. Chili bars offered at £73 for cash. English and Australian quite nominal, low prices would be accepted but no buyers appear.

TIN.—Market firm and higher, a large business done, closing price £115 to £115. 10s. cash, and £116 to arrive, buyers. The production for Banca for 1868 is officially given at 60,000 Pikuls or 12,000 Slabs, or 44,000 Slabs less than the average of the past 17 years. In Holland market firm at 76¼fl. to 67½fl.; Billiton 67½fl.; English tin firm at full prices.

TIN PLATES are in fair demand.

LEAD.—Dearer £19. 5s. for good soft English, £19. 10s. for L. B., W. B., however, reduced to £20. 15s. We would call attention to the new brand of Herbst & Co., Call Eifel, best double refined lead for manufacturing white and red lead of extraordinary purity, price £20. 10s. in London.

SPELTER.—Dearer and good business done £21. 10s. to £21. 15s. spot, special outports, £21. 15s. to £22. Belgian and German £21. 5s.: V. & S. £21. 5s.

VON DADELSZEN & NORTH.

SAN FRANCISCO STOCK MARKET.

A telegram from San Francisco, dated March 17, quotes:

STOCKS.	Per Sh.		SHARES.	Per Sh.	
Gould & Curry.....	107@		Belcher.....	15	20
Savage.....	66		Imperial.....	87	85
Chollar Potosi.....	162	161	Alpha.....	32	..
Hale & Norcross.....	95	93	Amador.....	...	
Crown Point.....	75	72	Kentuck.....	255	
Yellow Jacket.....	63	..	Ophir.....	32	

ASSESSMENT—Belcher Mining Co.—$3 in coin per share. Delinquent April 17—Sale May 3, 1869.

Nevada Mining Patents—Letter from Commissioner Wilson

The Virginia *Enterprise* publishes the following letter addressed to Senator Stewart by Joseph S. Wilson, General Land Office Commissioner, in answer to some verbal inquiries in relation to the patents thus far issued and applied for by mining companies in Nevada. Sixty claims for patents, according to the Enterprise, have been received at the General Land Office. In forty-four of these applications the necessary reports (of survey and of the Register and Receiver) have not yet been forwarded, and action is therefore withheld. In four of the sixteen remaining cases adverse titles have been filed, which must be adjudicated in the local courts. This leaves twelve claims to which patents have been or will be issued as soon as the necessary papers can be prepared;

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE, Dec. 26, 1868.

W. M. Stewart, United States Senate—Sir: Referring to your personal inquiry as to the number of Nevada claims received at this office for patenting, under the Mining Law of July, 1866, I have the honor to present the following:

First—The returns of survey for sixty claims have been received from the Surveyor General, but in forty-four of these cases the reports which the law makes with the survey a basis of patents, have not yet been received from the District Land Officers.

Second—Of the sixteen cases in which there have been received returns of surveys and reports from Registers and Receivers, there are four in which adverse interests are asserted, determinable only in the local courts.

Third—Of the remaining twelve, patents have been prepared for the North Star, Utah and the Knickerbocker gold and silver mining claims; while the Hale and Norcross claim, with several others, are now in hands for patenting and will be disposed of in a few days.

In the first eighteen months after the passage of the mining law much delay occurred from a want of familiarity on the part of occupants of the mines, and also in the local adminstration, in regard to the proceedings required under the statute. This inconvenience, unavoidable at first, and not unusual in the case of new enactments, is now at an end by the adoption and promulgation of a system of rules to facilitate operations and realize the liberal intentions of the framers of the mining legislation.

In some of the earliest reported cases, the fact was brought to light that a claim might be asserted under new names to an old mine having expensive improvements thereon, the real owners being uninformed because of the publication and posting of notices during their temporary absence, or in remote and unoccupied districts during the suspension of mining operations in Winter.

To enable the Executive to administer the law with as little disturbance as possible of the local mining regulations and customs, and secure the ends of justice, it would be proper for each claimant to file, with his application, some appropriate evidence that he is the *bona fide* holder of a certain number of original claims, according to mining customs.

All necessary testimony may be furnished in the form of affidavits and certificates, to obviate the inconvenience and expense of taking witnesses to the land offices, frequently at great distances from the premises claimed.

The instructions issued from this office were prepared with a view of rendering the expenses of applying for a patent as light as possible, on the one hand, and on the other with the purpose of administering the statute according to the liberal spirit and intent of its provisions.

With regard to the law itself, I can only say it is doubtful whether any enactment could have been prepared accomplishing the objects aimed at and secured by the Mining Act, with less expense and inconvenience. In a few happily worded sections it effects a purpose more extensive in its scope than is frequently attained by much more elaborate enactments.

Very respectfully, your obedient servant,
JOSEPH S. WILSON, Commissioner.

SCHOOL OF MINES & METALLURGY,
UNIVERSITY OF MISSOURI.

A Generous Compliment.

The following is extracted from the *Transactions of the Royal Imperial Geological Institute of Austria, Vienna*, 1868, p. 226, (Dr. FRANZ RITTER VON HAUER, Director.)

[TRANSLATION.]

AMERICAN JOURNAL OF MINING, *Engineering, Geology, Minerglogy, Metallurgy, Chemistry.* New York (WESTERN & Co. Proprietors, ROSSITER W. RAYMOND, Editor. Office 37 Park Row.) Year 1867 and 1868, Vol. V., No. 1–21, New Series.

By way of exchange against our publications, we now receive this American mining and metallurgical Journal, which is equally distinguished by its editorial management (Redaktion), by the fullness of the material represented, and by its mechanical execution. Each number gives, under fixed headings an abundance of the latest and most interesting reports from the States of North America. All sciences relating to mining and smelting of ores, such as machine-building, metallurgy, chemistry, geology and mineralogy are equally represented in the JOURNAL, as also are the commercial movements and statistics of the products of the mineral kingdom. The excellence of the illustrations accompanying the different articles leaves nothing to be desired.

In every number we find almost constantly the following subjects represented: Editorials—Original Papers—Correspondence—Illustrations—Mining Summary (Gold and Silver, Copper, Coal and Iron, Miscellaneous)—Manufacturing and Mechanical Notes—New Publications—Special Notices—The Iron Trade—The Coal Trade (Quotations, Shipments, Freights)—Patent Claims—Special Scientific Brevities—On Dit about Minerals.

We must also praise the extreme punctuality and regularity of transmission, in which this Journal may be favorably contrasted with many other home and foreign weekly papers.

AMERICAN

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NEW AGENCY.—GEO. E. CUMMINGS has been appointed our sole agent in Philadelphia, Pa., for the AMERICAN JOURNAL OF MINING, our new paper, the MANUFACTURER AND BUILDER, and our Spanish paper, EL CORREO HISPANO-AMERICANO. His address is 154 South Fourth street, Philadelphia, Pa., where all information respecting communications, subscriptions and advertisements for these papers will be gladly given to those who may wish to favor us with a call.

In making remittances for subscriptions, always procure a draft on New York, or a *Post Office Money Order*, if possible. Where neither of these can be procured, send the money, *but always in a registered letter*. The registration fee has been reduced to *fifteen cents*, and the present registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. *All* Postmasters are obliged to register letters whenever requested to do so.

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NEW YORK, SATURDAY, MARCH 20, 1869.

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NOTICE TO CORRESPONDENTS.

In consequence of a new regulation recently adopted by the Postmaster of this city to facilitate the early delivery of mail matter, we have to request our correspondents, in addressing us, to give the number of our post-office box, No. 5,969, in lieu of, or in connection with our business office address.

STATISTICS OF MINING—THE COMMISSIONER'S REPORT.

The report of the Commissioner of Mining Statistics for the States and Territories west of the Rocky Mountains has just made its appearance. The House of Representatives has ordered an extra edition, which will doubtless be ready for distribution in the course of the summer. As the Commissioner has no control over that edition, persons desiring to obtain copies gratis should apply to their representatives in Congress. Meanwhile, those who prefer not to wait until they are served in this manner, may be accommodated if they desire to purchase the book, as an edition has been issued by Messrs. J. B. FORD & Co., Printing House Square, New York, and is offered for sale at the price of $1.50 per copy. By an arrangement with that house, orders sent to the publishers of the JOURNAL OF MINING will be filled at the same price.

It is well known that the editor of this journal sustains very intimate relations of friendship and consanguinity to the Commissioner—relations amounting, in fact, to personal identity—which render him, on the one hand, incapable of perceiving all the demerits of the report in question, and, on the other hand, quite unwilling to make known those faults which he does recognize. Under these circumstances, a criticism of the work will not be expected of us; and we shall confine ourselves to a statement of its contents and its aim.

The report is divided into two parts, the first of which includes some observations of the present condition of the mining industry of the West, while the second is occupied with a discussion of the relations of governments to mining. The first part is so evidently lacking in comprehensiveness as scarcely to challenge criticism under that head. A few remarks on some of the most important mining districts of California; an essay on the condition and prospects of the Comstock mines; an account of the new districts of Eastern Nevada (including White Pine); a word only upon Arizona and Utah; a good description, by Messrs. EATON, KEYES and DE LACY, of Montana; a chapter on the mineral resources of the Isthmus of Panama; a very brief report on a few mines in Idaho, by MR. ASHBURNER; nothing at all about New Mexico, Washington and Oregon—this is the whole. The reasons for this partiality are hinted in the report itself. It was not necessary to go over the whole ground so soon after the publication of Mr. J. Ross BROWNE'S elaborate report; and, if it had been necessary, it was not possible. Congress neglected to make an appropriation for the work, and the Commissioner was unable to employ assistance. The absurdity of expecting a single man, without organized aid, to wander over the vast Pacific slope, picking up statistics, like a hen picking up corn in a barn-yard, is sufficiently evident. The Commissioner made a journey of some 13,000 miles, mainly with the intention of gaining a general personal knowledge of certain portions of the field which he had never before visited. In the course of this journey, he collected considerable information; and was obliged to decide whether he would withhold it from publication because it was not complete, or publish it while it was fresh, and likely to be of value to the country. This portion of the report is illustrated with profile-sketches of many important mines—a feature which, if time and means had permitted, would have been introduced to a much greater extent, and which, we cannot but believe, will add greatly to the clearness and value of the remarks in the text, and impress on the minds of many readers more distinct notions of the character of underground work than they have hitherto been able to obtain from merely verbal descriptions.

The second part of the report contains a general discussion of the nature of the mining industry, in its relations to the welfare of the whole country, and therefore to the powers and duties of the Government. The argument is enforced with a historical outline of the rise and development of the principles of mining law, and the conclusion is drawn, that the true American system should borrow certain features from the policy of other nations, but retain after all a type of its own, in harmony with our democratic institutions,

The keynote of the whole discussion is the proposition, that, as in all other respects democratic principles require that government shall give the greatest liberty to the individual compatible with general order and progress, and that the intelligence of the people, based upon education, shall take the place of those restraining agencies upon which "paternal" governments are wont to rely, so in the matter of mining, the precious mineral resources of the country should be freely intrusted to individual enterprise, and education should be recognized as the only safeguard to which a democratic government should have recourse, for the prevention of those mistakes, or that reckless wastefulness in the development of these sources of wealth which would entail upon the country, in the present, serious loss, and, in the future, irreparable disaster. Education is the governor upon our engine, without which its unchecked action, dependent only upon the fires of head long, passionate enterprise that burn beneath, might tear to pieces the whole machine. As an appropriate sequence, therefore, to the section devoted to mining law, there is in this report a discussion of the subject of mining education, including the plan for a National School of Mines. The views of the Commissioner on these points are well known to the readers of the JOURNAL OF MINING; and these particular expressions of them will be hereafter published in our columns, in the form of extracts from this report.

As a whole, this work is merely preliminary in its nature, and we shall be content to learn from the comments of the critics that it is satisfactory to nobody, but suggestive to everybody.

NEW EXPLOSIVES.

A German chemist proposes to prepare a new explosive, called *Dualine*, by saturating common powder with nitro-glycerine. It is claimed that in this way different degrees and varieties of power may be obtained, suitable to the precise nature of the work to be performed. We are inclined to doubt the practical advantages of this plan, and it is a serious question whether it does not combine all the elements of danger existing in each of the ingredients. Will *Dualine* explode when heated, when hammered, or when kindled? Does it explode more or less easily than common powder? In this country, and we think in Europe also, the comparatively harmless form of nitro-glycerine known as Dynamid or Giant Powder is meeting with great favor. But it is best suited to those circumstances which require instantaneous and violent explosion, and at the same time permit the close confinement of the powder. In rocks that are split up with seams, it has frequently failed to give perfect satisfaction. Whether by mixing it in varying proportions with common powder an *adjustable* powder can be obtained, the nature of which may be at any times altered to suit the special case arising, is an important question; and it is equally important to find out whether the miners themselves would take the pains to manufacture the quality needed as each case arose.

The whole subject of explosives is in its main outlines quite simple. Questions of safety or convenience can not be decided by theoretical arguments, but are speedily determined by experience. In questions of the relative degrees of power developed by different compounds, it is curious to observe how nearly the calculations of theory correspond with the observations of practice.

The fitness of a given explosive for a given kind of work depends on the total amount of pressure generated by its combustion, and the time within which it is generated. Leaving out the latter item for the present, let us examine the relations of the former to three principal and representative explosives, gunpowder, gun-cotton and nitro-glycerine. Dynamid will need no separate consideration under this head, as it may be regarded as simply a certain quantity of nitro-glycerine, mixed with a pulverized material of perfectly neutral character. The following figures are extracted from an elaborate article in London *Engineering*.

One grain of blasting powder produces 0,884 cubic feet of gas; one grain of gun-cotton, 3.45 cubic feet, and one grain of nitro-glycerine 2.976 cubic feet. But the temperature must be taken into consideration; and experiments have shown that the temperature engendered by the explosion of powder is 3,910 degrees C., that of gun-cotton 7,307 degrees, and that of nitro-glycerine 6,878 degrees. Reducing these rosults to a common denomination, and applying *Mariotte's* law, we find that a cubic foot of powder creates a pressure of 3,130 atmospheres; of gun-cotton, 4,240 atmospheres; and of nitro-glycerine, 31,510 atmospheres. These materials differ widely in density, and their relative effects where equal *weights* are taken do not assume the above order.

On the contrary, conditions being assumed which secure the confinement of the gases until they have exerted their maximum pressure, the resultr, by weight, appear as follows:

One grain of powder..... 200 lbs. per square inch.
One grain of gun-cotton.....1,204 lbs. per square inch.
One grain of nitro-glycerine..1,167 lbs. per square inch.

In other words, considering simply the volume of gas at the instant of explosion, the effects produced by equal weights of these three compounds are in the proportion of 1: 6.02: 5.835. These theoretical conclusions may surprise the advocates of nitro-glycerine, as well as those who have been accustomed to despise gun-cotton.

But it must be borne in mind that a further correction is required, dependent upon the time occupied and the completeness attained by the combustion. The explosion of gunpowder is not instantaneous, but progressive; and that of gun-cotton, though far more rapid, is still inferior, both in this respect and in completeness of combustion, to the sudden transformation of nitro-glycerine into gaseous form. Allowance being made for these facts, the theoretical calculation agrees very nearly with the verdict of experience, that a certain amount of powder produces an explosive effect equivalent to that of one-sixth its weight of gun-cotton, or one-tenth its weight of nitro-glycerine.

It remains to be remarked that mechanically equivalent effects are not always interchangeable in practice. If we desire to *move* a block of stone, the expenditure of the necessary quantity of power in *hammering* it will not accomplish our purpose. There is a certain elasticity in the formulas for the manufacture of gun-powder, by means of which it may be suited to different kinds of work. But nitro-glycerine has never yet been taught to labor in harness, and to pull slowly or with a jerk, as the occasion may require. We confess that we cannot perceive how the attempt, mentioned at the beginning of this article, to increase the usefulness of gunpowder and nitro-glycerine by harnessing, as it were, the tame old nag and the fiery young colt in one team, is likely to improve the qualities of either.

Judging from present appearances, we incline to the belief that mining engineers in particular will find it most convenient to use them separately, employing suitable powder for large "lifts," and nitro-glycerine (in the form of Dynamid) for cases requiring swift and powerful explosion.

Gun-cotton long ago retired from laborious business and has amused itself for many years in the occupation of photography. But there are some indications that it will again assert its place among what a Western editor calls the "busters." We may hereafter find occasion to consider its claims and merits.

PROCEEDINGS OF THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

It is our purpose to give, in future numbers of the JOURNAL OF MINING, a full report of the proceedings of the American Polytechnic Association—a society which is connected with the American Institute, and bears the same relation to the mechanic arts and general science as the Farmers' Club does to agriculture. The reports which usually appear in the political papers are meagre in the extreme; the reporters seem to be unable either to appreciate the value of the matter which is brought forward, or to understand the meaning of what is said; and we assert, without hesitation, that the public in general gains no idea of the interesting and practical nature of the transactions which take place in the rooms of the association. An examination of our report of the meeting of last week will show that the subjects and matter of the discussions relate to some of the most important interests of every day life. Artificial light; the preservation of organic substances, whether animal or vegetable; the hygienic considerations which govern the

construction of foundations, basements and floors, and many other themes, are such as should occupy the attention of every intelligent citizen; and they were handled with a degree of ability, which certainly exceeds that of the ordinary articles upon these subjects which find their way into the newspapers.

A BRILLIANT IDEA.

The following paragraph from the most unscientific member of the scientific press, is quoted by the London *Chemical News*, without further comment than the above title.

"Justus Von Liebig, the celebrated German chemist, recently told a friend that, during the last ten years, he had received seven calls from American Universities, and that twice he felt strongly tempted to go to the United States, and accept there a professorship. We trust that Liebig will visit this country and give our people the benefit of his varied stores of information; but we cannot advise him to cover up his light under the bushel of a college professorship. If the Baron wishes to make his name and fame conspicuously useful, he had better accept a position upon the editorial staff of the *Scientific American*, through whose columns he could reach and educate a hundred thousand minds each week."

It is doubtless true that Baron LIEBIG, would be very "conspicuously useful" in the position referred to—as much so as a light in the dark. But possibly he may have somewhat wider notions of education than the conductors of a journal who desires to contract with him to "educate a hundred thousand minds each week." Brilliant indeed.

NEW PUBLICATIONS.

We have to thank Dr. H. CREDNER, of Halle, Germany, for several interesting and important papers concerning the geological formations and mineral deposits of different parts of North America. These essays are among the results of several years' sojourn in the United States. We think no European geologist ever visited this country who was better qualified than Dr. CREDNER to comprehend these subjects, or who brought to the work more enthusiastic devotion and untiring industry. We have already given our readers a translation of his report on the gold mines of Virginia; and we shall hereafter take pleasure in performing the same service for other equally interesting works from his pen. Among those recently received are the following: *Geognostic Sketches from New Brunswick in North America: Description of Certain Interesting Associations of Gold in the State of Georgia; Description of Certain Characteristic Occurrences of Native Copper at Keweenaw Point, Lake Superior.*

Dr. CREDNER is, so to speak, by birth a geologist. His distinguished father, Councillor CREDNER, held for many years a chief position in the mining department of Hanover; and after that kingdom ceased to exist, accepted, under the Government of Prussia, an office scarcely less exalted. Of his many valuable contributions to science we cannot speak at present, further than to acknowledge with thanks the receipt of a very thorough treatise on *The Members of the Upper Jura and Wealden formation in Northwestern Germany*, published at Prague—a work which, besides the value of the detailed descriptions which it contains, throws much light on the general question of the diverse characters of synchronous deposits, and, conversely, the degree of certainty with which the synchronism of formations may be inferred from similarity or identity of fossil fauns and flora. We have for some time inclined to the belief that identity of fossils in different, widely separated formations argues anything but simultaneousness of origin. But this subject can only be elucidated through patient study and intelligent comparison of facts.

REPORT UPON THE PRECIOUS METALS: *being statistical notices of the principal gold and silver-producing regions of the world, represented at the Paris Exposition.* By WM. P. BLAKE, *Commissioner from the State of California.* Washington, 1869.

This is one of the reports of the United States Commissioners to the Paris Exposition, and of all that have thus far been made public, it is perhaps the most important. Mr. BLAKE's familiarity with the subject, and his industry and skill as a writer have enabled him to present a great deal of fresh, and arrange a great deal of old, material, so as to produce an admirable review of the gold and silver mining of the world. The book contains sketches of the gold regions of North, South and Central America, Australia, New Zealand, Europe, Asia and Africa, and the silver regions of the United States, Mexico, Central and South America, Europe and Asia. There are also chapters on platinum and other rare metals; on the production, consumption and movement of the precious metals, and on the unification of gold and silver coinage throughout the civilized world. With regard to the latter subject, Mr. BLAKE observes a strict neutrality, contenting himself with a clear statement of the various plans of Messrs. RUGGLES, ELLIOTT, DUNNING and others, most of which have been discussed in the JOURNAL OF MINING. A variety of interesting tables and other information is given in the Appendix. The author has issued a small edition of this report, and the publishers of the JOURNAL OF MINING will receive and fill orders for it. It is beautifully printed, and forms an octavo volume of 369 pages. Particulars as to price will be given hereafter. We propose also to make extracts from time to time, as the crowded condition of our columns will permit; and in this way our readers will obtain a clearer notion of the excellence and value of the work.

ANSWERS TO CORRESPONDENTS.

J. E., OF MASS.—We were correct in our reply to B. M. R., of Va., that plumbago is *not* a compound of carbon and iron. It is true that the pure natural plumbago contains about one per cent. of iron; but this is an accidental impurity, and not in chemical combination, as the iron may be entirely removed and the remainder will be still purer plumbago. This would not be the case if plumbago were a compound of carbon and iron. Plumbago is only a peculiar allotropic condition of carbon, as are diamonds, lampblack, etc. To your second question we reply that salt, when dissolved, is not muriate of soda. This is an old and obsolete view, dating from a time when the element chlorine was considered as a compound of *muriam* and oxygen. Common salt is always a compound of sodium and chlorine, or chloride of sodium; and the paradoxical theory that *dry* salt only can be so considered, but that salt in solution is something else, cannot be maintained.

W. G., OF N. Y.—There is no general ratio between the external and internal diameters of a hollow tube, which secures a maximum strength. The proper ratio dspends entirely on the nature of the material employed. The minimum difference between these diameters we find, perhaps, in the quill of a pen, in which it is 19:20, or thereabouts. In wooden tubes, the proportion is about 1:2; in brass, 3:5; in iron, 7:10, etc. When these proportions are observed, the hollow bar has from twice to 1,000 times the strength of a solid one containing the same amount of material. The absolute strength of beams similar in form is in the direct ratio of the width, and the square of the sectional height. The increased weight of large beams must also be taken into account.

MICA, OF NEWBURGH.—We are not aware of any use to which you can readily and profitably put biotite, dependent upon its percentage of potash. Its value must be determined, like that of other micas, by its smoothness and firmness of cleavage, and the size of the masses which can be obtained. Felspar is sometimes used for its potash, being added in finely pulverized form to soils which lack that ingredient. But we do not think mica would be so good, since it contains less potash, and is much less easily decomposed. Finally, even if there were any such use for mica, biotite would be inferior to muscovite or common mica, which contains more potash. Biotite is characteristically a *magnesia* mica.

J. T., OF NEWARK, N. J.—We do not exactly understand the difficulty you propound. In KUSTEL's new process, the soluble chlorides are extracted from the mass by leaching, and the chloride of silver is left. We do not think that a solution of chloride of silver in brine is necessary in panamalgamation; but even if it were so, the addition of a little salt in the pans would furnish the necessary conditions. Your other questions have been answered in our columns. If you are not satisfied, ask them again. We will do our best to give the information you desire.

A. D. F. G., OF NEW YORK.—We do not know what is the present condition of the Keystone Company. The mines at Austin are not being worked, and the mill, which was partially destroyed by fire, was rebuilt at White Pine by Capt. PAGE, and sold to the Eberhardt Company of that district. The old Keystone organization seems to be out of sight, but some broker of the mining board may be able to tell you who are the present officers, or put you in connection with other "disappointed but hopeful" stockholders.

O. T. C., OF IND.—Common coal tar from the gas works is too liquid a material to make with gravel a good concrete pavement. It should first be subjected to distillation, in order to remove the most liquid and volatile parts, which constitute the so-called "dead oil," and are used for the production of benzole, napthaline, paraffine, aniline, etc. The residuum, very similar to pitch or asphaltum, liquefied by heat and mixed with gravel, makes a good concrete pavement. It is also in Philadelphia universally employed as a roofing material.

C. Y., OF N. Y.—To etch your name on steel, coat the tool with a thin layer of the so-called engravers' varnish, which is a compound of wax, pitch, mastic, etc. Simple wax or tallow is not so well adapted to the purpose. When the varnish is cool, mark your name with a pointed instrument, cutting through the varnish in order to expose the metal; then any acid which attacks the steel, such as nitric acid, applied for a few minutes, will make the name permanently visible, after the varnish which protects the rest of the steel from the action of the acid has been removed.

W. R. J., OF PA.—A perpetual motion, as the term is understood in mechanics, is not necessarily a machine that creates a force, but a machine that, when once started, will go on for ever, till worn out. If any excess of power is obtained, which can be applied to some useful purpose, so much the better. We advise you, however, not to try for too much. The perpetual motion alone will tax your science quite severely enough!

A. R., OF FOND DU LAC, WIS.—The ore of White Pine District is thus far mainly chloride of silver. When treated by amalgamation, it is subjected to the Washoe process, which involves wet crushing. When smelted, as we believe the richest ore will be, it will not require previous reduction to pulverized form.

F. D., OF LA.—Wishes to know the composition and mode of manufacture of gold-colored and violet inks. They are simply solutions of various dry aniline colors in diluted alcohol or acetic acid. These dry colors are at present an important article of commerce, and may be obtained in any large manufacturing city.

J. K., OF BOSTON.—Any person has a right to construct a velocipede for his own private use. However, when some feature in it is similar to an existing patent, it is dangerous to offer it for sale, as the patentee of this feature might be expected to enforce his patent when he found it out.

I. W. R., OF N. J.—A permanent magnet will never entirely lose its power—not even when the armature or keeper is removed from the poles. It will, however, become weakened to a certain degree, depending on the quality of the magnet. The circumstance you mention will, however, affect the action of this law.

J. R., OF OHIO.—"Gas lime" is not regarded as a good fertilizer, the impurities of the gas being injurious to vegetation.

Original Papers.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

THE CHEMICAL OPERATIONS—XI.

BY PROF. G. HINRICHS, OF THE IOWA STATE UNIVERSITY.

VOLATILIZATION—CONTINUED.

85. The volatility of those substances which at common temperatures maintain the gaseous state, is greater by far than that of ordinary solids and liquids. Many gases are liquefied by being passed through a tube surrounded with a suitable freezing mixture. The temperature at which they are liquefied is that at which, being liquid, they would fly into gaseous form; in other words, their boiling point. This is for

Sulphur dioxide (sulphurous acid)	—10.0	degrees	C.
Ammonia	—38.5	"	"
Carbon dioxide (carbonic acid)	—78.0	"	"

Of these bodies the last named is evidently the most volatile.

86. It may here be well to remark that we can readily obtain figures more easily admitting of comparison by referring the temperatures to what is known as the *absolute* temperature. This is obtained by adding 273 degrees C. to the temperature indicated by the centigrade thermometer, by which process we get rid of the minus sign, and obtain figures which can be more easily comprehended. We have thus from the foregoing tables the following:

	Boiling point, absolute temperature.		
Carbon dioxide	195.0	degrees	C.
Ammonia	234.5	"	"
Saltpeter dioxide	263.0	"	"
Aldehyde	293.8	"	"
Ether	307.9	"	"
Alcohol	315.4	"	"
Water	373.0	"	"
Iodine	448.0	"	"
Phosphorus	563.0	"	"
Sulphur	688.0	"	"
Mercury	723.0	"	"

The student will comprehend that this is merely a method of expressing degrees of heat independent of the freezing point of water, which constitutes the zero of the centrigrade scale. There is no reason in nature why temperatures below that point should be called *minus*, as though they involved an amount of heat less than nothing, or, so to speak, a positive quantity of cold! In the table just given, all the degrees are positive, and hence the magnitude of the figures opposite the different substances expresses the volatility in reverse order—the higher the boiling point, the larger the figures, and the smaller the volatility.

87. The boiling point of liquids may be determined by means of a distilling apparatus consisting of a flask, in which the substance is volatilized, and a thermometer, inserted so far into the neck of the flask as to cause the bulb to be surrounded by the vapor which rises from the heated liquid, and escaped into a condenser, to be finally collected in liquid form in a reservoir. The condenser, cooled with water, is necessary to prevent the vapors from accumulating so as to raise the pressure upon the liquid above that of the atmosphere. Such an increase of pressure would raise the boiling point, and destroy the accuracy of the experiment. This apparatus is also used in *fractional distillation*, or the separation of liquids which vaporize at different temperatures.

17. FLAME-COLORATIONS.

88. If the loop of the platinum wire is dipped into a solution of common salt, and then held in the *colorless* flame of the BUNSEN burner, or a glass alcohol lamp, the flame exhibits a *yellow* color, due to the salt particles volatilized. If a narrow strip of copper is exposed to a flame, this flame will show a fine green color.

89. These colorations, being peculiar for each substance, are of value in determining the nature of a substance. They are also of extreme delicacy. If a platinum wire be exposed to the intense flame until it imparts no trace of any color to it, and then (after cooling) be touched by the fingers, it will, upon again being held in the flame, tinge it yellow for a considerable time, showing that the moisture of the fingers contains a trace of salt.

This extreme delicacy also necessitates the utmost care in cleaning the wire before making use of it for tests of this kind. The wire is cleaned by repeated boiling with pure nitric acid and subsequent exposure to the intense heat of the flame, and not until the wire has ceased to impart the least coloration to the flame is it fit for use.

90. These flames are further investigated by means of green and blue glasses. It is most convenient to have these mounted as spectacles. Deep green and deep blue glasses, tinged with chromium and cobalt respectively, are required.

The yellow flame of common salt is invisible through the blue glasses, and exhibits a plain orange hue when seen through the green glasses. Accordingly, these glasses enable us to detect two or more substances in the same flame. This will be shown more completely in the practical part of this work. (I have found it exceedingly convenient to have the blue and green glasses in the same spectacle frame, so that the blue glass is before one eye and the green glass before the other. While bringing the wire into the flame *both* eyes are kept open in order to be able accurately to estimate distance; then the eyes are alternately shut so that in quick succession *both* flame tests are applied.)

18. SPECTRA.

91. A more accurate analysis of these flame colorations is obtained by means of the *spectroscope*, the brilliant invention (1860) of BUNSEN and KIRCHHOFF of Heidelberg, Germany. Either by the hand or by a similar support the flame-coloring substance is held in the hot margin of the flame, E' of a BUNSEN burner. (The chimney, H, is not essential). The light passes into the telescope-tube, CD, through the slit, D, the width of which can be increased or diminished at pleasure by means of a screw. The lense, C, makes the rays emerging from the tube parallel. Falling upon the prism, A, these rays are now deflected from their course by refraction, and the telescope, EF, is fixed in such a position as to admit them through the objective lense, E. By proper adjustment of the eye-piece, F, of this telescope, the slit, D, is clearly seen as a narrow line through F, E.

92. If the wire held in the flame contains a little common salt solution, we shall see only *one bright yellow line* (No. 6 in the plate of spectra). This is called the sodium spectrum.

If the slit is directed toward the sky, a complete *solar spectrum* or rainbow (No. 1 in the the plate of spectra) will be observed, showing very distinctly a number of perfectly black lines, running transversely through the beautifully colored spectrum. These lines are called after their discoverer, an optician of Munich, FRAUNHOFER's lines. They are particularly plain when the slit is made quite narrow. They always occupy precisely the same position in the solar spectrum; the larger ones FRAUNHOFER distinguished by letters, as shown in the plate—but there are besides almost innumerable finer lines, which require more powerful spectroscopes to be seen.

93. The colored plate represents the spectra of several substances, showing that the lines are entirely different for the different substances. Consequently *a substance may be recognized by the spectrum of the light it emits when heated.* This mode of analysis, or rather determination, is called spectral analysis, and is the invention of Bunsen and Kirchhoff. Its two great excellencies are extreme delicacy and a far-reaching power.

94. Bunsen has shown that even as inconceivably small a quantity as 1-180,000,000th of a grain (or less than 1-10,000,000th of a milligramme) of sodium can readily and distinctly be recognized by the flashing of the yellow line. (No. 6, spectral plate.) It is interesting to look through the spectroscope at the gas flame merely, holding nothing in it. The yellow sodium flame is seen flashing up every few instants, showing that the gas itself contains some sodium.

Already four new elements, thallium, caesium, indium and rubidium have been discovered by the peculiar spectra (No. 3, 4, 5 in the plate), which were observed when certain mineral substances were held in the flame, spectra not belonging to any then known elements.

95. Since this mode of analysis depends only upon an inspection of the *light* emitted by the body, it is evident that the *distance* of this body from the spectroscope is immaterial to the spectrum formed. Hence, the *heavenly bodies, as far as they are visible, may be analyzed by the spectroscope,* thus extending the demain of chemistry to the whole universe. This work has already been successfully prosecuted. Bunsen and Kirchhoff analyzed the sun, Huggins and Miller and also Father Secchi and others have analyzed a great number of stars; among others, also the new star which appeared in May, 1866, in the Northern Crown. (See the chapter on Cosmical Chemistry.)

96. Many metals are not volatile enough to give a spectrum when held in the gas flame; the gases, on the other hand, are too volatile for that purpose. Hence the spectra of metals are produced by inserting the metals in the voltaic arch, while the gases are made luminous enough by means of the electrical spark. Although these spectra are of the utmost scientific importance, we cannot here enter into a more detailed account of them, particularly as they are not used in common chemical research.

AMERICAN INSTITUTE.

Proceedings of the Polytechnic Association.

PROF. S. D. TILLMAN, IN THE CHAIR.

The attendance at the meeting on Thursday evening, March 11, was unusually large, and it was quite evident that the room in which these meetings are held is entirely too small for the purposes of the Association. The chairman opened the proceedings by reading a series of exceedingly valuable and interesting notes on the scientific novelties which have been recently brought forward.

The first item related to the recent discovery of Dr. G. Q. Colton, of New York, who claims that nitrous oxide, or laughing gas, is a specific for neuralgia. The Dr. has successfully administered the laughing gas to 34,000 persons, for the purpose of performing dental operations without pain, and, by persistent personal efforts in Europe, has at last succeeded in introducing the use of this for similar purposes in Paris and London. In many instances persons afflicted with asthma have been greatly relieved.

Dr. Feuchtwanger remarked that chloroform is unquestionably a better anaesthetic than nitrous oxide. Owing to the short duration of the effects produced by nitrous oxide, it is doubtful if this gas can be made to replace chloroform in surgical operations.

Dr. D. D. Parmelee.—It is perhaps not generally known that chloroform alone is not now used in our best hospitals. The effects of chloroform are such that the patient is frequently beyond recovery before any indication is given of its deleterious effects. For pure chloroform has been substituted either ether, or a mixture of ether and chloroform,

Extra Digits.

Under this title, Doctor Burt G. Wilder, Professor of Zoology in the Cornell University, has presented many curious and interesting facts concerning the occurrence of supernumerary fingers and toes. In his memoir he gives an account of 152 cases, and is anxious to receive any information which may be sent to him. Mr. A. E. Kendal, remarked that he had known a number of cases of six fingers, and in the case of one family this feature seemed to be hereditary.

Dr. Vander Weyde stated that he had known a case in which but one finger existed in the hand the bones having grown together.

Zirconia Light.—The oxide of Zirconium, has been successfully substituted in France for lime and magnesia pencils in the hydro-oxygen light. Zirconia had been previously and often subjected to the action of the hydro-oxygen blow-pipe, and as it was found to remain entirely unaltered, its use for the purpose of procuring light has been patented. The inventor obtains his zirconia by transforming the native silicate of zirconia into the chloride of zirconium, and then substituting oxygen for chlorine in the latter compound. The zirconia thus obtained is first calcined, then moistened and poured into moulds, with or without other agglutinant substances, such as borax or clay. As zirconia is more expensive than lime or magnesia, it is proposed to make the exterior only of the pencils of zirconia, the interior being composed of cheaper material.

Dr. Feuchtwanger.—The great difficulty in this case will be the expense of the zirconia. Zirconia is one of the rare minerals, being found in but few localities and not very plentifully in these.

In reply to a question relating to the quality of the light, Dr. Vander Weyde said: The zirconia light is nothing new. It is merely the old Hare or oxy-hydrogen light with zirconia substituted for lime or magnesia. Zirconia has been used before for producing light, and so have most of the earths, but the present improvement consists in a better method of preparing the zirconia. Lime gives an intense light when placed in the flame of the oxy-hydrogen blow-pipe, but it crumbles away. Different specimens of lime are of different values for this purpose. Some are almost worthless, while some good pieces of lime will last for a long time. The lime from Glen's Falls has been found to be the best in this country. But magnesia is better than lime, and zirconia is still better than magnesia, as it not only gives a very intense light, but it lasts a long time.

Mr. Phin—The probability is that the quality of any pencil of lime will depend upon two things. Its freedom from such foreign substances as tend to render it fusible, and its freshness. If the pencil is not freshly burned; if it has become hydrated in the slightest degree, it will fall to powder at the first touch of the oxy-hydrogen flame. In my experience, whenever the light begins to fail, I look with confidence for evidences of fusion on the surface of the pencil. It is well known that various substances, such as silica and some alkalies and metals, render lime very fusible when they are mixed with it.

A gentleman present here asked if the new light could be made so steady and so easily used that it would serve for ordinary purposes of illumination.

Dr. Vander Weyde.—There is no difficulty in the matter if the apparatus be in charge of a good chemist. The lime light can be maintained for hours, if the gases are regularly supplied and the apparatus properly attended to. But the ordinary attendants of lighthouses, etc, are not chemists, and cannot manage the apparatus.

Mr. Stetson—It is strange that this light should still be called the Drummond light. This name was given to it by the English, who have not yet found out that we Americans can do anything, and have not yet discovered—or at least have not yet published in their books—that Morse had anything to do with the telegraph, or Field anything to do with the Atlantic cable.

[The facts will hardly sustain Mr. Stetson's assertions, at least so far as the telegraph and cable.—Reporter.]

Mr. Fisher.—The lime light was discovered by Dr. Hare, of Phila. Goldsworthy Gurney used it and called it the "Bude Light," and Lieutenant Drummond used it as a signal in the great English survey, and it was called the Drummond light. It should be called the Hare light.

Mr. Phin.—If my memory serves me right, the Bude light was not a lime light at all, but a light produced by sending a stream of oxygen through the centre of an Argand lamp. The name was derived from the residence of Mr. Gurney, in the South of England. Afterwards it was applied to the illumination of the British Houses of Parliament, the stream of oxygen being passed through the centre of Argand gas burners. But it was found difficult to regulate it and it was abandoned.

Mr. Fisher.—I am very much surprised at this, for I understood that a stream of oxygen passed through the centre of an Argand burner would *diminish* the light rather than increase it. Dr. Vander Weyde has, if I recollect aright, exhibited some experiments before the club which go to prove this. By passing too much air through the centre of an Argand burner the light is diminished.

Dr. Vander Weyde corroborated the views of the last speaker, and thought Mr. Phin must have made a mistake. He gave a minute description of the mode of operation of the Drummond light and two kinds of apparatus which he employs for producing it, and promised to bring the apparatus to the club next Thursday night.

Mr. Phin.—There cannot be any mistake about what the Bude light was. This is a mere question of history and fact. All writers on the subject will tell you that the Bude light was produced by the combustion of a hydrocarbon—either oil or gas—in the presence of pure oxygen. As to the possibility of producing an intense light in this way there can be no doubt, as I have performed the experiment many times myself. It is no doubt true that too much oxygen or too much air will diminish the light. Hence, when we mix gas with air and then burn it, we find that it gives no light. This is illustrated in the Bunsen burner, or to take a more common object, the gas stoves used for heating and for cooking. But it is also true that the intensity of the light depends upon the degree of heat produced in the flame. Hence the fact that it requires the intense heat of the oxy-hydrogen flame to make lime luminous; but if we could get the same degree of heat by the use of common air as by the use of oxygen, we would get an equal amount of light. Now, the reason why common air fails to produce the same intense heat that oxygen does, is this: common air contains a great deal of inert matter—nitrogen. This nitrogen has to be heated to the same temperature as the burning gases, and consequently the temperature of the flame is lowered; the same amount of heat will evidently impart a higher temperature to one pound of material than it will to five pounds, just as a kettle half full will boil more quickly than a kettle entirely filled. A very ingenious gentleman of western New York, Dr. Geo. H. Smith, acting on this principle, adopted the plan, using common air and common gas for producing the oxy-hydrogen light, but he heated the gases before bringing them together. In this manner he attained a starting point so far in advance of that secured by the previous methods that the final temperature given out by the flame was abundantly capable of producing an intense light. In the Bude light the temperature of the luminous portion of the flame is increased, provided there be not introduced so much oxygen as will combine with all the luminous material of the flame before its light-giving properties are evolved. Where oil lamps are used the manipulation is easy, but where coal gas is employed the relative pressures of the coal gas and oxygen must be carefully regulated, or failure is the result. If Dr. Vander Weyde should bring a supply of oxygen to our next meeting, I will try to reproduce the experiment.

Aluminium Bronze.

This beautiful alloy, which closely resembles gold, and which is composed of nine parts of copper with one of aluminium, is rapidly making its way in the arts. M. Dumas stated to a late meeting of the French Academy of Sciences that this bronze was now successfully used in various kinds of mechanism, especially in saws driven by steam power, which saws, although much thinner, lasted a much longer time than those of steel. It has also been applied with great success to the construction of journals in machinery intended to be run at a high speed.

Dr. Feuchtwanger presented a specimen which he had carried in his pocket for some years.

Valuable Preservative Preparation.

Although the useful properties of carbolic acid are well known, its use has not been extensive on account of its objectionable odor. To remove this odor, Dr. Harris, health officer of New York, recommended camphor. Two parts by weight of gum camphor may be added to one part of carbolic acid in crystals. These solids, on being rubbed together for a few minutes, form a liquid. It is a powerful disinfectant, but must not be applied to the skin unless very greatly diluted. When the preparation is required to prevent the ravages of insects it may be more conveniently used in a solid form, which may be obtained by adding whiting to the liquid. Ladies will find the presence of this powder very effective in the preservation of furs.

Dr. Parmelee suggested that there must be some mistake about the formula given for the preparation of the new article. Solid carbolic acid is an article never seen in the New York market, being altogether too expensive on account of the very great trouble involved in its preparation. Unless some way of using the liquid acid could be devised he did not think that the discovery promised to amount to much.

Dr. Feuchtwanger.—Why use carbolic acid when permanganate of soda is so much superior. A body was recently sent from this city to the South, and kept in a state of perfect preservation by the occasional application of a solution of permanganate of soda. Solid carbolic acid undergoes a change by keeping—becoming red, and this change renders its use unpleasant.

The Chairman thought that the Doctor was laboring under an error with regard to the superior virtue of permanganate of soda. Experiments have proved that carbolic acid is superior to all other disinfectants. Sulphurous acid and the sulphides stand next.

Dr. Vander Weyde here remarked that carbolic acid had been used in some experiments for the preservation of animals by suffocating them in a room filled with the vapor of carbolic acid. The plan succeeded well on a small scale. The vapor penetrated the flesh very completely, affecting even the most minute fibrils. It was tried first with a chicken, then with a sheep, and finally with a bull. It worked very well with the chicken; succeeded tolerably with the sheep, but the bull gave a good deal of trouble. He became rather unmanageable before he succumbed. A question here arose as to the peculiar action in the case of Dr. Harris' preparation. Does the camphor merely neutralize the odor of the carbolic acid, and does carbolic acid neutralize the odor of the camphor? It was the general impression that the odor of the carbolic acid is fully neutralized, but no information was given in regard to the odor of the camphor.

Mr. Stetson made some general remarks in regard to the distinction to be maintained between antiseptics and disinfectants. Salt is an antiseptic, for it prevents putrification. Carbolic acid is a disinfectant as it destroys, or, at least, neutralizes contagious infection.

Gun Cotton.

This material seems to be attracting public attention as an explosive agent in mining operations. The principal objection to its use—its liability to spontaneous decomposition—it is said, has been removed by the use of a weak alkali, and it has been successfully employed in the form of compressed charges. Messrs. Abel & Brown of the Royal Arsenal, Woolwich, the gentlemen who introduced these improvements, have recently made a still more important discovery. In experimenting with nitro-glycerine and gun cotton combined, it occurred to them to try the detonating fuse in exploding gun cotton alone. The results showed that gun cotton exploded in this way has even more destructive force than nitro-glycerine. A detailed account of these experiments has not yet been made public, but if the reports which have reached us are correct the discovery will be of great importance to mining engineers.

Dr. Parmelee.—I do not know that any explanation can be given of the strange facts here announced. We know that if a powder magazine should explode any other magazine existing in the vicinity will be likely to explode too. If a little of any of the fulminates be exploded all the other packages of fulminates in the neighborhood will explode. This is one of the circumstances which render the use of fulminates so dangerous.

Mr. Phin.—It is announced that the peculiar detonating or fulminating property which is described in the article read by the Chair may be propagated even through explosive material which is not confined. Thus it is said that if a train of gun cotton be laid on the floor, and one end of it be ignited by some sharply explosive substance, the whole of the cotton will explode with great violence, whereas if it be simply fired with a light or a flame it will burn quietly. The action of various fulminates was then discussed, and the well-known *pulvis fulminans*—a preparation which has been known for centuries—was adduced as an illustration of the subject on hand. When simply fired it fizzles away, burning slowly and quietly, but if heated until it melts, so that the particles can all unite at the same moment, it explodes with terrific violence, more resembling the action of the metallic fulminates than the operation of a substance composed of materials resembling those which enter into the composition of gunpowder.

Dr. Vander Weyde.—The property which confers its great value upon gunpowder is that it cannot be exploded by ordinary concussion, and it is even difficult to ignite it with a flame. There is a common lecture-room experiment which I have often performed and it is this: I have taken a basin of alcohol and set it on fire, and then taken a handful of iron filings mixed with gunpowder and shaken them into the flame. The filings will burn and the powder will not. Iron is actually more combustible than gunpowder.

Mr. Phin.—I have tried the experiment described by Dr. Van der Weyde, and it succeeds perfectly. There is another experiment which illustrates the same thing. I have strewed a train of gunpowder on a board for a length of two or three feet and then crossed it at right angles with a train of fulminating mercury. On firing the train of powder at one end it burns slowly up to the fulminate, which explodes and blows the powder all about. In general the powder is extinguished at the crossing of the train of fulminate, and the part of the train of powder which lies beyond this point does not burn.

Zoological Discoveries in Madagascar.

Recent explorations of M. Grandidier prove that at the time the island was inhabited by the gigantic Dodo or Epiornis it also possessed certain huge pachydermata, strongly resembling one of the most remarkable African species, viz.: a kind of hippopotamus. The remains of about fifty hippopotami, mingled with those of the dodo, were found in a marshy district on the west coast of Madagascar.

Basement Floors.

Prof. Rolliston, of Oxford, in a communication to *The London Lancet*, calls attention to certain important points which the study of recent sanatary literature and of mechanical house building has impressed upon his attention. The most important is that relating to floors and foundations. It seems to be clearly made out that the interposition of a lyer of impervious substance, of whatever kind, so that it be impervious, between the level of the ground water in the soil, and the floor of the house built upon it, confers upon such a house an immunity in cholera epidemics. Facts in support of the truth of this statement are contained in a recent paper published by Prof. Pfeiffer, and Dr. Rolleston is of opinion that the indications they afford should lead us to extend, over the entire area occupied by a house a layer of the same impervious materials which is put into the so-called "damp-course" of the walls. Such a superficial stratum can be easily made by a mixture of gravel and gas tar. It would effectually prevent the rising of the watery vapor out of the damp soil, which the "aspiring" effect of a warm house does so much to intensify over the area which it covers. Where the doors and windows fit closely, the draft of chimneys is constantly acting upon the air in the soil covered by the house in the fashon of an imperfectly exhausted receiver, and what is thus drawn up must be more or less malarious. Dr. Rolleston refers further to the necessity of removing the subsoil dampness as a preventive of consumption, as shown by the researches of Dr. Bow-

DITCH and BUCHANAN, and he remarks that there is some little difficulty in reconciling its attainment with the present system of sewerage, but notes that at Lubeck the ends of the sewers have been secured by surrounding the ends of the drainpipes with a layer of gravel.

Mr. STETSON.—This is a very important subject. It does not always happen, however, that a house with a moist foundation is an unhealty house. I know a house in New England which is built over a spring of clear water, and the health of the inhabitants of that house has always been remarkably good. If I wished to render that house malarious I will tell you how I would do it: I would dam up that spring so as to have stagnant water in the cellar; I would plant trees all round so as to prevent the light of the sun from ever reaching the house, and I would build high and tight fences all round so as to cut off all circulation of air. Then I think I would have succeeded in making the house unhealthy.

Dr. FEUCHTWANGER then read a very interesting paper on breccia and other marbles, illustrating his remarks by some beautiful specimens highly polished.

Mr. FISHER read an article from COLBURN'S Engineering, in which were given numerous instances of the superiority of the screw over the paddle wheel as a means of propelling vessels. Mr. FISHER thought if the commercial question had been left to solve itself, and the paddle wheel steamers had not been aided by government subsidies, the screw would have driven them out of use. Attention was called to the advantage possessed by twin screws over single screws. Mr. FISHER thoughtthat this might be accounted for by the fact that in the single screw propeller the water from the propeller is driven against the rudder, and does not have clear way.

Mr. EMORY thought that the reason why twin screws placed at the sides of a vessel are more effective than a single screw at the stern is that the twin screws work in more solid water than the other.

Mr. JOHNSON presented his method of forming a tunnel underneath the East River. The subject has been fully discussed at former meetings.

Mr. FERGUSON exhibited a model of his self-acting alarm for low water in boilers. The apparatus seemed to promise efficiency and durability.

The Haulage of Coal.

The following is from the London *Colliery Guardian*:—The report of the committee appointed by the Mining Institute to investigate the subject of the haulage of coal has just been issued. It forms a handsome volume of upwards of 200 pages, interspersed with numerous tables, and a profusion of carefully-drawn diagrams illustrating the various systems of haulage in practice, and the machinery employed in their working. The names of the acting members of the tail-rope committee—Messrs. William Cochrane, George B. Foster, John Daglish, Lindsay Wood, and R. F. Matthews, with that of Mr. Emerson Bainbridge, the engineer to the committee—are appended to the report. These gentlemen have evidently bestowed an extraordinary amount of labor in the investigation of the important subject they were called upon to inquire into, and the result of their efforts is brought together in a tangible form, which cannot fail to possess the utmost interest for all who are engaged in the working of coal. The report is full and elaborate, and the mass of reliable statistics presented to the reader enables him to form an estimate of the value of the conclusions at which the committee have arrived. Five several systems of underground haulage are reported on; the tail-rope system: the endless-chain system; No. 1 endless-rope system; No. 2 endless-rope system; and the South Wales endless-chain system. No one of these systems is recommended for general use, each of them being deemed peculiarly and most advantageously applicable to one or more conditions of wagon-way.

The tail-rope system is the first which comes under consideration. This is the plan of conveying coal underground chiefly practised in the counties of Northumberland and Durham, where it has stood the proof of many years' trial, and is believed to have attained a high degree of perfection. A leading feature of the tail-rope system is its applicablility to almost any condition of wagon-way, the crookedness of the way, irregularity of gradient, and the existence of numerous stations and branches, forming no obstacle to its effective working. Five tail-rope plans under varying conditions are reported upon: North Hetton, Seaham, Seaton Delaval, Harraton, and Murton. The methods of applying the tail-rope system at these collieries are minutely explained in the report. The power required under this system is often very great, and the first cost of the engines, drums and boilers necessary for its production varies in the instances adduced from £849, as at Seaham colliery, to £1,410 as at Seaton Delaval. But a large number of branches can be worked by it with little increase of annual expenditure, except in the item of labor. It seems that the cost of leading coals on tail-rope planes is considerably in excess of the cost on endless-chain roads. Where several branches are worked, the cost of labor will be about the same on the two systems, although as a rule, branches can be worked on the tail-rope system with much less labor than by any other system. The chief defects of the tail-rope system, as compared with the endless chain, are summed up in the report under the following heads:

1. The heavy cost of engine and drums.
2. The necessity to cut long stone drifts on meeting large troubles, in order to make an easy gradient.
3. The wear and tear of ropes.
4. The heavy expense of an accident on the engine plane.
5. The large amount of power required to overcome the friction of the sheaves and rollers upon which the ropes are carried.

The report concludes that the tail-rope, at least under one condition, has an advantage over every other system, viz., when the plane to be worked has numerous branches, and when the gradient of the wagon-way and branches is either level or undulating.

Next in order comes the endless-chain system. The experiments on endless-chain planes recorded in the report were all made in collieries at Burnley, under the management of Mr. Waddington. Though the endless-chain system has been in operation at Burnley and other parts of Lancashire for many years, it has until lately been very little known in the North of England. It, too, is adaptable to every condition of of wagon-way, but differs from the tail-rope system in the following important items:

1. As a general principle, it may be stated that when the two ends of an undulating plane are at the same level, the power required to work such a plane will be very little more than if the plane were perfectly level.

2. A heavy gradient can be worked safely and efficiently.

3. Since the chain will only work safely in a straight line, or at the most, round a slight curve, every sharp curve upon the plane necessitates the erection of two pulleys in order to direct the chain to another curve, and requires the attention of a man or boy.

This system is extensively followed on the surface at Burnley, and the district being very hilly, it is found economical. Four endless-chain planes are reported on in the work before us—Hapton Valley; Dunnow, top and low beds: Rowley, underground and surface chain-road; and Clifton Hall. In nearly every case the engines working the endless-chain at Burnley are of the same class—12 1-2-inch cylinder vertical overthrow engines, and the engine plane consists of two lines of rails, one for the full and the other for the empty tubs, moving in opposite directions. On the main road, without branches, the labor and cost with the endless-chain will be much less than with the tail-rope. The chain is estimated at Burnley to last twelve years, but chains are in operation which have been working more than twenty years. In the working of this system very small horse-power is wanted, and hence a considerable economy of coal is effected. The defects of the endless-chain system pointed out in the report are:

1. Every curve or connection between a branch and the main ginney road requires the attention of a man or boy.

2. The first cost of the wagon-way is greater than when tail-ropes are used, owing to the great weight of chain, and a double way being requisite.

There is no doubt that the adoption of this system must prove very economical in the district in which it is chiefly used.

The endless-rope system No. 1 is closely allied to the tail-rope, but has hitherto been adopted in the working of underground planes only to a limited extent. Five different planes, presenting four distinct methods of applying the system, are reported on—Shireoaks colliery, California Pit, Newsham colliery, Eston mines, and Cinderhill colliery. The plan pursued at Newsham, of having a single way, as with the tail-rope system, and of running over part of the rope on shelves by the side of the way, is considered the best arrangement of the system, and one which, for reasons given in the report, may be expected, under some circumstances, to supersede the tail-rope. As far as this endless-rope system has been developed, its chief defect seems to be in its inapplicability to the working of branches from the mainway, the tightness of the rope precluding the possibility of off-take links being used, as with the tail-rope. There has scarcely as yet been sufficient experience of this system to justify an opinion as to its general economy as compared with other systems.

The endless rope system No. 2 is only in operation in the district of Wigan, and there it has not been in use many years It is worked on the same principle as the endless-chain, wire rope being substituted for the chain, and the connection between the rope and the tubs being made by short chains instead of the fork arrangement. Five planes on which the endless-rope system No. 2 is in operation came under the notice of the committee. The report suggests but one condition of wagon-way to which it can be more economically applied than any other system, viz., "when a mainway without branches has a rise only in one direction, and has several curves, sharp or otherwise." In this description of plane less power and less labor would be required under the endless-rope system No. 2, and the construction of the curves would be much less costly.

The South Wales endless-chain system is only to be met with at the Brynddu colliery, where it is adopted as the most economical method of hauling the coals up a heavy gradient of eighteen inches to the yard, this being the inclination of the seam of coal worked. Where the Lancashire endless-chain system—which can only be safely worked where the gradient does not exceed twelve inches to the yard—becomes inapplicable, the South Wales system may be adopted. But it can only be considered as more applicable than any of the other systems under the following conditions of wagon-way, viz.:

1. When the plane to be worked is straight, has a regular inclination heavier than twelve inches to the yard, and has or has not stations by the mainway.

2. When the plane to be worked has a regular inclination heavier than eight inches to the yard, and has stations by the side of the mainway.

Some excellent remarks upon the comparative merits of these five systems of underground haulage appear at the end of the report.

In conclusion, the committee state that from the experience they have been able to gain, as far as the cost of maintenance and working charges is concerned, the endless-chain system can be applied, with few exceptions, to every condition of wagon-way, with greater economy than any other system, these exceptions being the cases:—1. Of the tail-rope system, where numerous branches are worked; 2. Of No. 2 endless-rope system, where the plane rises in one direction, and has one or more sharp curves: and 3. Of the South Wales endless-chain system, where the gradient is heavier than one in twelve, or one in eight, where stations are worked. The committee is also of opinion that No. 1 endless-rope system is to be preferred to the tail-rope, when the plane is undulating, has neither stations nor branches from the mainway, and is with or without slight curves; that the No. 2 endless-rope system is only to be economically applied under the conditions stated in the report, and that it cannot be advantageously adopted where the planes are undulating; and finally, that the tail-rope system is preferable to No. 1 and 2 endless-rope system, whenever any stations by the side of the plane or branches from the mainway are to be worked.

There can be no question that the committee have executed the arduous task committed to their charge with extreme ability, and the report reflects high credit upon their intelligence, practical knowledge, and industry.

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FIG. 1 is a perspective view, and Fig. 2 a vertical section, showing the internal construction. Fig. 3, shown in the accompanying cut, is to be used with

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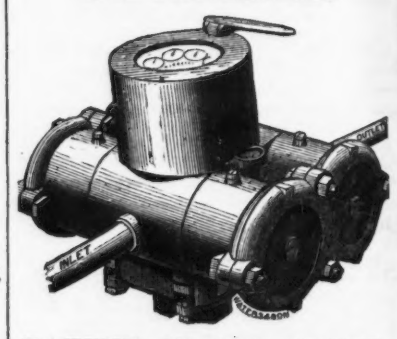

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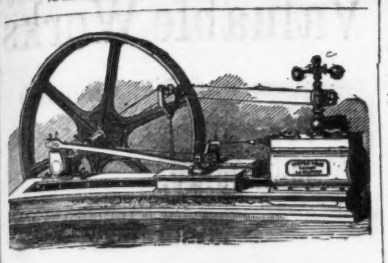

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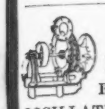

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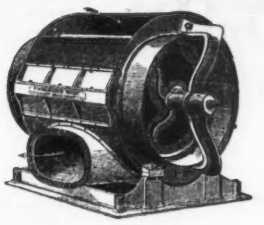

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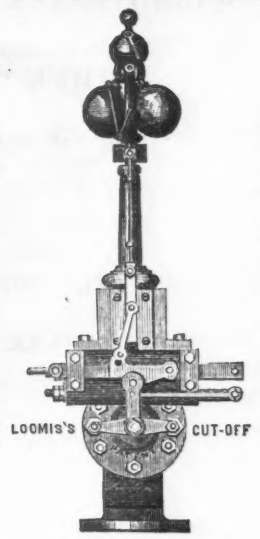

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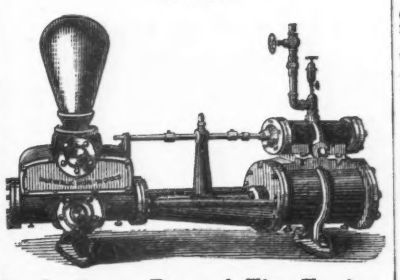

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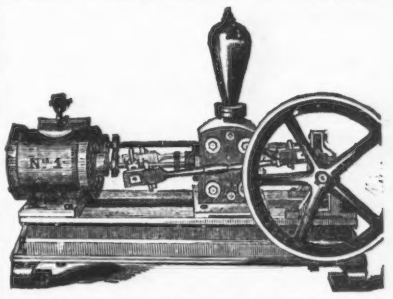

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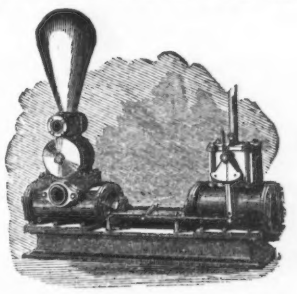

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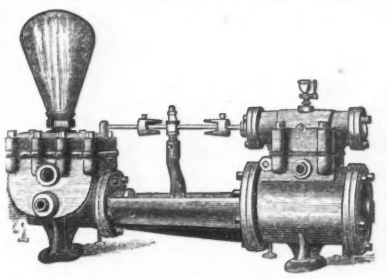

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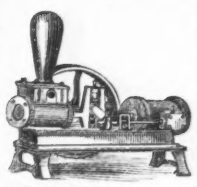

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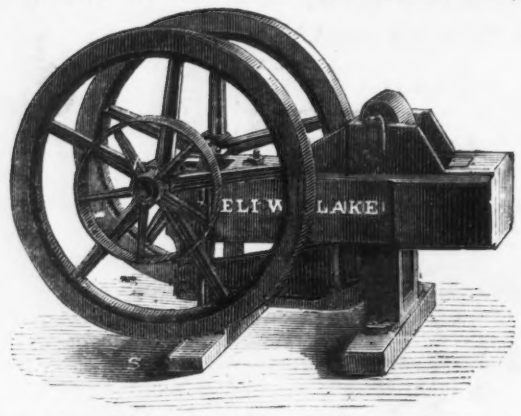

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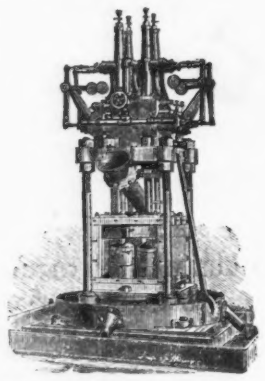

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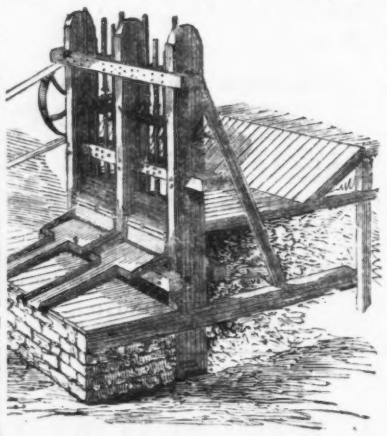

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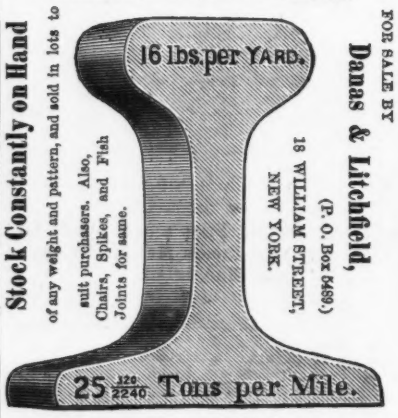

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